April 1969

NOTES 4-1-69 SIEBEL

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2. MDA: We have shipped to ASTN the structural test unit of the MDA with more than 500 strain gauges installed.

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NOTES 4/1/69 JOHNSON
4/1/69

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1. Bennett
~~2. Molly Mp~~
3. Nancy

REMAINDER OF 4-1-69
NOTES

NOTES 4/1/69 FOSTER

B 4/8

4/29

INSTITUTIONAL PLAN REVISION

We have been informed that General Bogart intends to present the MSF Institutional Plan to Dr. Mueller at the OMSF directors' retreat April 11-13 and the Center directors' retreat May 1-3. (MSFC's input was supplied during February 1969.)

In addition he intends to cover certain modifications to the plan which will include the effect of the Apollo stretchout and the FY-70 budget proposals. Further, the field Centers are being asked to make general impact statements to possible program changes such as deferment of Saturn IB follow-on production, restart of Saturn V deliveries (516 and subsequent starting one year earlier), a three per year launch rate starting in FY-74, extended Apollo launch schedule for Lunar Exploration (starting with 507), slip in AAP Core Program and concurrent launches of AAP and Lunar Exploration missions in FY-71 and 72.

We are coordinating the efforts of the various Center elements in support of General Bogart and will review the information with Center management prior to furnishing our reply.

FULTON ASKS COMPLETE HISTORY OF NASA's FY-70 REQUEST

Rep. Fulton, senior Republican on the House Space Committee and the MSF Subcommittee, on March 19 asked Dr. Paine for a presentation showing reductions made by BOB from the $4.7B and $4.2B budget requests. Mr. Fulton's stated interest is to restore funds in areas where crippling reductions have been made and to find optimum rates of expenditure.

B 4/8

NOTES 4/1/69 HAEUSSERMANN

4/1 HD

ATM Hydrogen Alpha Telescope Cross Hairs. Reference Notes 2/17/69 Haeussermann. In response to your question about Dr. Tousey being happy with the MSFC decision to incorporate the mechanical cross hair subsystem, the answer is that he is satisfied. However, at the PI meeting last week, several PI's (notably Drs. Newkirk and Giaconi) expressed a strong dissatisfaction with this decision. The dissatisfaction is primarily based on the expenditure of money for this change. Several other ATM experiment changes have been disapproved because of the lack of money. Further, a larger number of change requests as well as increased pressure for incorporation from the PI's can be expected.

B 4/8

NOTES 4-1-69 HEIMBURG

4/19/69

1. S-II ANOMALY INVESTIGATION: Shake tests of the J-2 oxidizer turbopump on the J-2 bobtail stand to the 3g level have shown that the pump gain obeys predictions. No increase in pump gain, as had been theorized, with increasing vibration levels has been observed.

2. S-II LEAK DETECTION AND PURGE SYSTEM: Since S-II-508 and subsequent stages employ spray foam insulation instead of the helium purged insulation, nearly all of the leak detection and purge requirements can be deleted and the attendant GSE deactivated. In a meeting with the contractor this past week, methods were outlined to deactivate the maximum amount of GSE for the minimum cost. The resultant decisions should save the government a considerable amount of money over what was initially planned.

3. "MODERN LUBRICANTS" COURSE: Messrs. McKannan and Demorest and Mrs. Whitaker of the Materials Division will be teaching a course in "Modern Lubricants" April 21 - 25, 1969, at the University of Alabama in Huntsville.

4. AS-504 POST FLIGHT EVALUATION: Evaluation of the AS-504 flight loads during first stage burn was completed. Loads encountered were within the expected range with about 35% of maximum design load obtained during maximum loading.

5. AEROSPIKE THRUST CHAMBER DAMAGED: The aerospike thrust chamber being tested at Rocketdyne's Nevada Field Laboratory was damaged during a test on 3-20-69. Preliminary inspection revealed the damage consisted of a group of some 100 eroded tubes on the outer shroud and erosion of several injector strips. The thrust chamber assembly is being shipped to Canoga Park for evaluation.

6. LM/ATM EVA CONCEPTS: The LM/ATM EVA Working Group met 3-21-69 to review the status of EVA aids for ATM film retrieval. Astronauts had evaluated, in neutral buoyancy, the trolley rail translation and film canister transport aid and also a system of hand rails for astronaut translation with a dolly and hinged arm. The astronauts felt that the trolley rail was too difficult to move and had undesirable dynamic characteristics. Mr. Horton concurred with the Working Group in changing the base line from the trolley rail to the dolly system.

7. S-II-8 CRYOPROOF TEST: The S-II-8 cryoproof test was successfully completed on 3-28-69. This was the first cryoproof test of a stage with the spray foam insulation used in the programmed flight configuration. Post test inspection revealed only four minor defects in the insulation. These results indicate our efforts to incorporate the spray foam significantly improve our long standing insulation problems with the S-II stage.

B 4/8

NOTES 4/1/69 HELLER

4/2 9:05

1. A research review on Radiation Physics Research at MSFC was held on March 27. Representatives from Headquarters, other Centers, the Air Force and industry were in attendance in addition to MSFC. Particle radiation physics is one of the major scientific areas of SSL. Papers covered shielding studies, flight experiments, super conductivity, relativity experiments, cosmic rays and radiation damage.

2. RTSM and H-alpha Telescope: Progress has been made in the joint MSFC/ NRL Real Time Solar Magnetograph. The H-alpha telescope was received from Spectrolab this week.

This telescope will be co-aligned with the cassegrain telescope of the magnetograph instrumentation. Simultaneous observations yielding H-alpha images and Fe-line magnetograms will enable investigators to explore possible relations between flare development (monitored in H-alpha light) and magnetic field strengths, polarities, orientations, gradients, etc. (monitored with the real time solar magnetograph).

3. Thursday, March 27, Jesse Mitchell sent to McGuire, one of our young astronomers, a telegram stating that the proposal to fly on the Convair 990 during the aurora expedition was approved. During this expedition the 990 will be stationed at Fort Churchill for about 30 days during November and December of 1969. We will participate by using our TV systems to monitor the sky. It is essentially the same TV system presently being used for meteoroid astronomy. We hope to get information on the pulsating aurora and on the meteor environment. We heard of this expedition through Mr. Dubin about four months ago and submitted a competitive proposal shortly thereafter.

4. T-027: Word has been received that approval has been given to incorporate S-073 into T-027. However, we are waiting for the formal notice from OSSA before we start taking action. The question of assignment of S-149 to MSFC for combining with the T-027 flight is still open. Both S-073 and S-149 have PI's at Dudley Observatory. This action to incorporate S-073 will impact the Crew Station Review and Critical Design Review dates for T-027.

Len Yarbrough met with representatives from Quality Laboratory to discuss the in-house qualification program for T-027. The sample array can be tested in its entirety; however, with the advent of S-073/149 changes, the more satisfactory arrangement is for Martin to qualify it. A memorandum will be drafted for formalizing the working relationship for the sample array.

B 4/8

NOTES 4-1-69 HOELZER

4/10 AM

Nothing of significance to report.

NOTES 4/1/69 JAMES

B 4/8

4/1968

1. S-II Oscillation: The planned vibration testing of the "bob-tailed" engine with the center engine LOX feed line installed has been completed. MSFC is continuing to analyze the data and has furnished the data to NR for their analysis. Pulse testing started Saturday, March 29, using the "bob-tailed" engine with an accumulator installed adjacent to and connected to the present LOX sump. The first phase of the Mini "A" Structure Aft LOX Bulkhead Dynamic Test may start as early as April 1 with completion scheduled for April 14. Wyle Laboratories has indicated they will release the required shaker equipment to MSFC for support of the remaining test phases by April 18 as requested. We are targeting April 18 for decision on the early engine cutoff. This will allow us to review the static test results at your April 15 AS-505 Preflight Review and have a firm position for the April 22 Apollo 10 Flight Readiness Review. Although no harmful effects are expected, we and the Engine Program Office are finalizing the environmental limits for assessing possible damage to the S-II-8 engines as a result of the early center engine cutoff during static firing.

2. S-II-7 Insulation: Insulation work at MTF on S-II-7 is progressing with no problems. All feed lines have been sprayed and inspected. No rind was found. The cork which was installed while S-II-7 was on the stand has been inspected and found acceptable.

3. Guidance Switchover for Translunar Injection (TLI): Tom Stafford called me last week to ask what impact we would have on providing guidance switchover capability for TLI on AS-505. This would cover launch vehicle platform failures after liftoff, orbital coast or in TLI burn. We do not have a direct hardware or flight software impact since TLI switchover can be accomplished with a navigation update. AS-506 will be like AS-505 in this regard but AS-507 implementation will provide for this switchover without use of navigation update and the S-IVB cutoff from the spacecraft will be made an interrupt. I have told George Hage that we are implementing this.

4. Component Life Extension: I had a briefing March 28 on our Saturn IB and Saturn V Stage and GSE storage and the planned activity of the component life committee which I understand may be chaired by Karl Heimburg. It was pointed out in the briefing that one of the objectives of this committee is to extend the specification life of soft goods (elastomers, such as O-rings, seals, etc.). An extension of the present spec life of one or two years can save a great deal of money and positively affect the reliability and quality of our hardware; for example, if the spec can be extended for one year, it will prevent the changeout of approximately 100 soft goods on each S-IB stage of AS-206 and subs. In addition, the one year extension would mean that only 11 engines of 56 would require changeout of soft goods instead of 51 engines.

NOTES 4/1/69 JOHNSON

4/1/69

B 4/8

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NOTES 4/1/69 MOHLERE

B 4/8

4/1969

Negative report.

NOTES 4/1/69 MURPHY

B 4/8

4/1 KD

Fire Research in Space Vehicles: At the March 26, 1969 Fire Research Program Meeting (mentioned in my Notes of 3/24/69) a NASA Steering Committee on Fire Research in Space Vehicles was established. The Committee will operate through the NASA Aerospace Safety Research and Data Institute (ASRDI) under the chairmanship of Dr. Irving Pinkel and will:

1. Review the state-of-the-art in fire prevention, detection and extinguishment in space vehicles.

2. Develop requirements and needs for research where necessary.

3. Implement studies and programs.

Membership includes representatives from NASA Headquarters, OART, OMSF, MSFC, KSC, MSC, ERC, and Air Force (specifically the MOL).

Early studies and research effort suggested by MSFC were the development of CO/NO_2 gas detectors, noncombustible replacement for activated charcoal in ECS, wire insulation, etc. Dr. Pinkel or one of his representatives will visit MSFC soon to be briefed on our work in non-flammable materials, testing and other items of interest in the fire research area. ✓

National Safety Council Award: We have been advised by the National Safety Council that MSFC is to receive an Award of Honor for our safety performance in calendar year 1968. The Award of Honor is the highest award given by the Council and is based on improved performance in the reduction of frequency and severity of accidents. Our Award will be received in April at which time appropriate publicity will be arranged. ✓

NOTES 4/1/69 SPEER

B 4/8

4/19 B

AS-505 Mission Rules: The final MSFC Launch and Flight Mission Rules inputs for Apollo 10 have been made to KSC and MSC. There are no major open items in the Launch Rules, but several significant changes in the Flight Rules are pending completion of AS-504 flight evaluation or AS-505 vehicle changes. Open items include S-IVB restart GO-NO GO rules for engine chilldown failure; S-II engine out rules if the S-II center engine is shut down early; and guidance platform failure rules in the event of spacecraft crew guidance takeover. These open areas are being worked.

NOTES 4-1-69 Stuhlinger

B 4/8

4/1 ND

No submission this week.

MSFC ROUTING SLIP					
	CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
1	DIR	Mr. Jim Shepherd			
2					
3					
4					

REMARKS

The enclosed pictures show the full scale Serpentuator setup, which seems worthwhile for a half-hour demonstration to you and Dr. von Braun. We mentioned this subject in the recent Notes (copy attached). I would appreciate it if maybe you would have a chance to look at it and hear firsthand the story behind it.

There is an article being prepared by Public Affairs Office for publication in the Marshall Star and newspapers waiting for a good shot of Dr. von Braun flying the Serpentuator. Please let us know whether we should wait for such an occasion or go ahead with the release.

Hans

Nancy -
I would like Wuenscher
to talk to
about this - on phone -

CODE	NAME	DATE
S&E-ME-DIR	Hans F. Wuenscher	4-23-69

MSFC - Form 183 (Rev. February 1961)

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B 4/8

4/19

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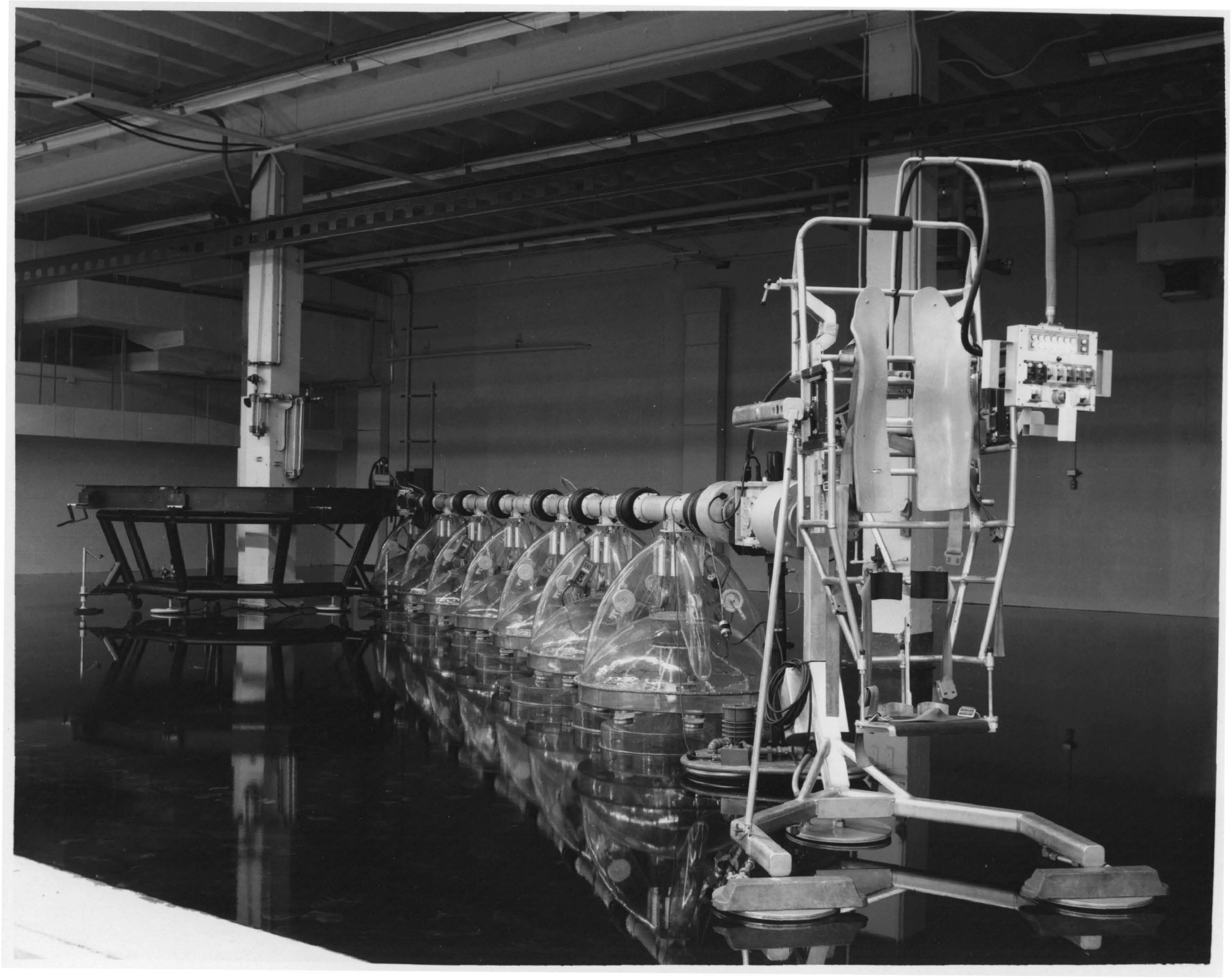


STILL CAPTION

20

SET NO.		CD NO.			NEGATIVE NUMBER						CLASS		MONTH		YR			LOCATION	
				A	7	1	8	5	2	U		0	1	9	A			3	0

DESCRIPTION:
21-69

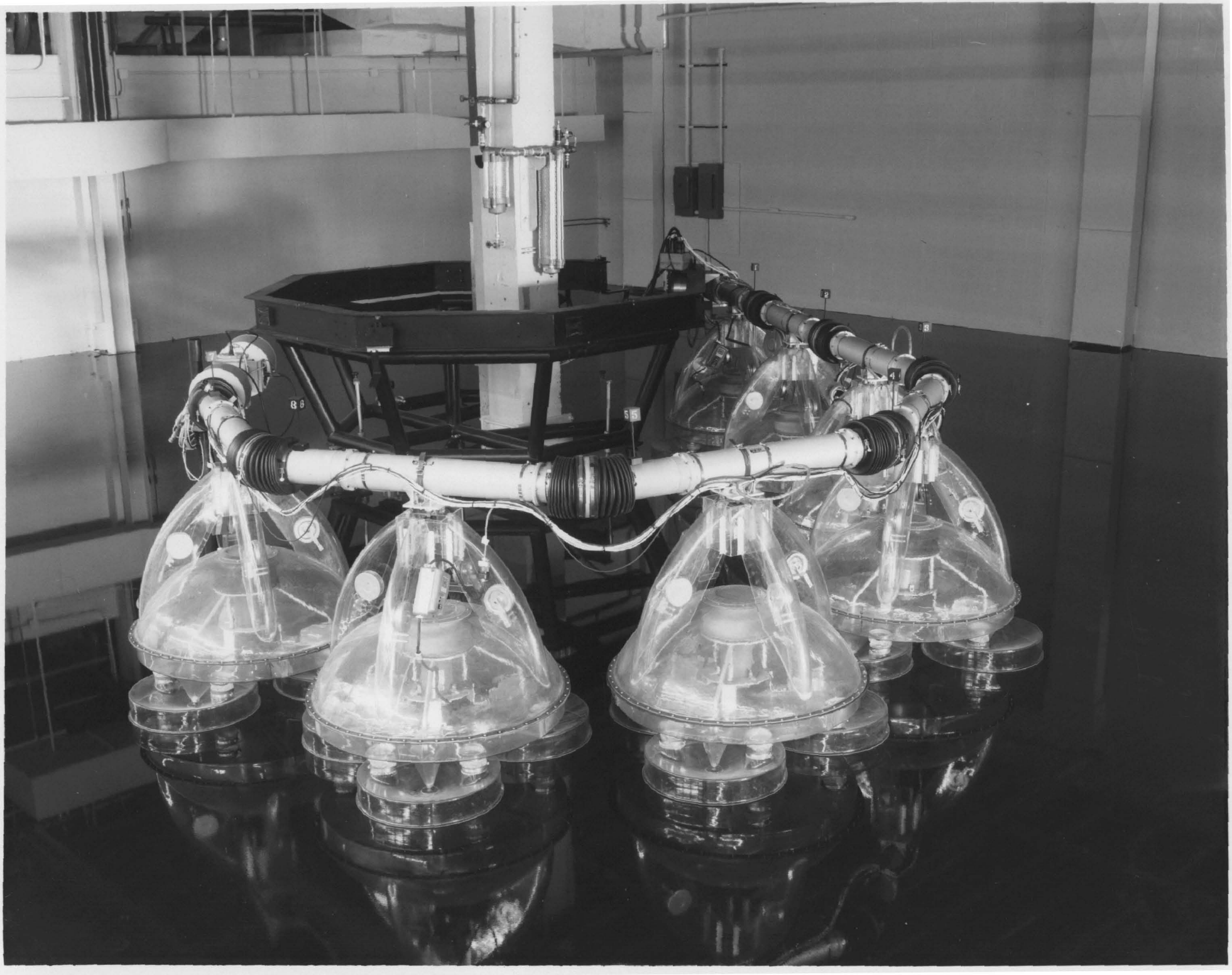
Serpentuator, all link straight, tip control out

for ~~vis~~ viewing, inboard view.

DATE: 1-3-69

PHOTOGRAPHER: Moss

MSFC - Form 1263 (Rev. Sept. 1957)



1 STILL CAPTION 20

SET NO.	CD NO.	TYPE	NEGATIVE NUMBER	CLASS	MONTH	YR	SIZE	TYPE	LAB/DFC
		A	733710	U	03	9	A		30

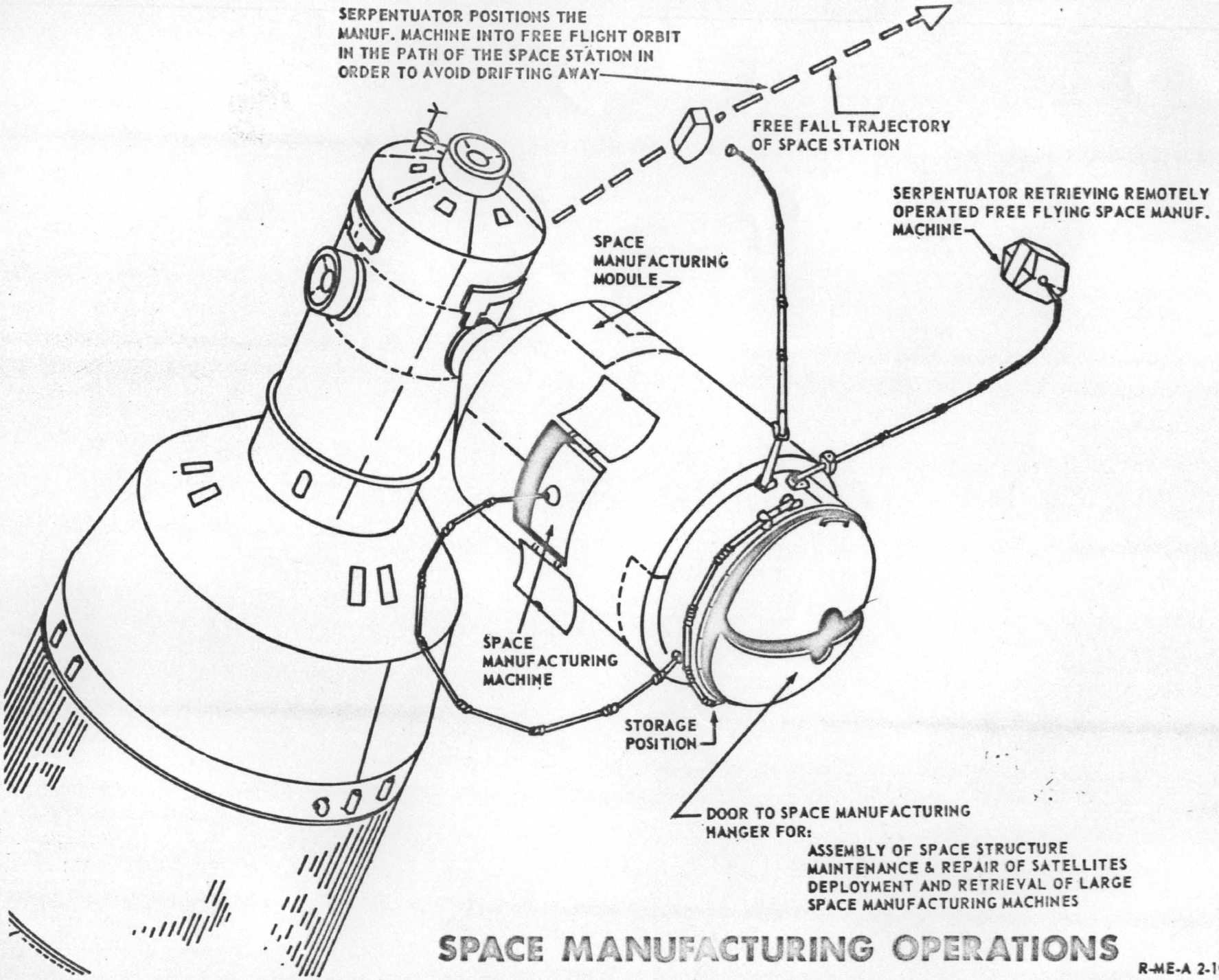
DESCRIPTION:
21-80

8 length 40 ft serpentuator

DATE: 3-4-69

PHOTOGRAPHER: Cramer

MERD - Form 1369 (Rev. Sept. 1967)



SPACE MANUFACTURING OPERATIONS

R-ME-A 2-19-69

This is a partial set of the
4-1-69 Notes. Dr. von Braun
asked that we distribute these
now. The remainder will be
distributed after he reads them.

NOTES 4/1/69 BALCH

4/1/69

B 4/2.

S-II-7 - Stage is in the vertical position in the S-II Stage Checkout and Storage Building undergoing insulation modifications. Stage is still expected to be ready to ship to KSC on 4/11/69.

S-II-8 - Cryogenic proof pressure test was successfully completed on 3/28/69 and static firing is scheduled for 4/8/69.

S-IC-10 - "Power-up" was accomplished on 3/27/69, and static firing is scheduled for 4/16/69.

BOMEX - The status review meeting scheduled for 3/27/69 and 3/38/69 was held at MTF as planned. Attendees from ESSA included Dr. Kuettner, Director of BOMEX, and Col. Barney, BOMEX Project Manager.

Signal Conditioning and Recording Devices are installed on all five of the BOMEX ships. The ship "Rainier" departed Gulfport on 3/31/69 for sea trials.

University Affairs - The Louisiana State University proposal to NASA Headquarters for continuation of their sustaining grant through the year beginning 9/1/69 has been received for review.

Contract Administration at MTF - The redelegation to the Air Force of contract administration at MTF on the Boeing and North American Rockwell stage contracts has been forwarded to Patrick Air Force Base for acceptance.

NOTES 4/1/69 BELEW

4/1/69A

B 4/8

LM SOFTWARE: We are in final negotiation phase with MSC on development of airborne software for the LM. In reaching the understanding, the factors recognized were: (1) MSC retains the basic responsibility for the LM Primary Guidance & Navigation System (PGNS), which will be GFE to MSFC/Grumman; (2) MSC has a contract with MIT, the software contractor; (3) The guidance requirements are a matter for joint Center development; and (4) Software/hardware verification by Grumman is of joint interest to the two Centers.

HABITABILITY SUPPORT SYSTEM (HSS) PRR: The Preliminary Requirements Review Board Meeting on Habitability Support System was held March 25. Board disposition was accomplished on all submitted Review Item Discrepancies (RID's). MSC has still not performed their formal requirements review of the two medical experiments for which HSS must provide data. We are proceeding on the best data available but may be required to backtrack upon receipt of formal requirements.

WACS PROPULSION MODULE PDR: The Workshop Attitude Control System Review was held March 26-27 at MSFC. Forty-six RID's were processed. Only one will need substantial study. It involves deleting the requirement to ship a propulsion module to SACTO for exposure to static firing environments. The Board Meeting is planned for April 17.

MDA/AM/PAYLOAD ENCLOSURE INTERFACE LOADS MEETING: Basic results of a loads meeting with ASTN (Heimburg) were: (1) Proceed with static structural test ASAP; (2) No modification to the MDA test article required; (3) Update test documentation to reflect 24 knot launch wind; (4) Release hold order on MDA dynamic test article start of fabrication; (5) ASTN will supply a complete set of static, vibration and acoustic test schedules for MDA, Payload Enclosure, and ATM next week. The MDA will be delivered to the test site (Building 4619) next week to begin test preparation and setup. The lower sylinder of the Payload Enclosure is planned for completion of fabrication and assembly by May 1, 1969. MDAC-ED will be directed to replace 16 rivets in the AM static test article to meet the revised loads.

MDAC/AAP-2 NEGOTIATION SCHEDULES: A rescheduling of the AAP-2 contract negotiations has been coordinated with the contractor and within the Center. This new schedule calls for a prenegotiation conference on April 16; contract negotiations April 17 through 25; and submittal of the executed contract to Headquarters on May 12. A teletype delineating this schedule and requesting a 30-day extension to the current reorder contracts is currently in Mr. Gorman's office for signature.

AIRLOCK MODULE MANAGEMENT MEETING: An Airlock Module Management Meeting will be conducted at St. Louis on April 3. The agenda has been sent to all cognizant MSFC organizations, Headquarters, KSC, and MSC.

NOTES 4-1-69 BROWN

B 4/8

4/1 9:05

F-1 ENGINE - Reference notes of 3-24-69 concerning failure of F-1 engine actuator hydraulic supply boss. The failed boss was one of a group of 12 obtained from a particular supplier in late 1967 and early 1968 and installed on engines F-6083 through F-6090 (S-IC-12 and S-IC-14). Bosses from all other suppliers have been determined to be satisfactory. The minimum wall thickness of the failed boss was 0.060 inches below drawing minimum (0.113 inches was reported previously) however, failure would still be expected from this wall thickness. All bosses in the field are being inspected. Any bosses below minimum thickness will require replacement of the No. 1 fuel high pressure duct. Cause of the improper thickness was apparently improper tooling and inspection at a high point of the forging.

Reference notes of 3-17-69 concerning the reduction in fuel pump head of engines F-6029 on AS-504 after 80 seconds flight time. This anomaly was probably caused by loss of lead from the front wear ring of the fuel turbopump, and had no effect other than the performance shift. Vehicle AS-505 and subsequent engines had a double inspection process of the wear ring, and this problem should not recur.

J-2 ENGINE - The AS-504 flight data will require a revision in the flight mission rules which previously allowed J-2 engine start attempt after recirculation system failure or main fuel valve failure in the open position. Acceptable modifications to these rules could probably be obtained from data from an AS-505 third burn experiment. Implementation would require software logic and IU wiring changes; however, this is the last flight vehicle equipped with instrumentation adequate for a thorough post-test analysis. The test data might save us a mission someday. Near specification start conditions can, we now believe, be obtained without the S-IVB stage recirculation system through the following procedure: (1) Open main LOX valve and chill LOX system with a five second LOX dump through the engine. (2) Close main LOX valve and wait 100 seconds. (3) Open the main fuel valve for an eleven second fuel-lead start.

B.B.
Has Apollo Prog. Office made a decision?
D

The contract for J-2 Engine Operational and Flight Support covering the period from January 1, 1969 through June 30, 1970, was approved by NASA Headquarters on Friday, March 28, 1969. An executed copy of the contract will be handcarried to the Contractor's plant on March 31 by Headquarters personnel who will be attending the Program Review.

CONSTAN 4-1-69 NOTES

4/19 B 4/8

Visitors:

Bell Aerosystems is preparing a proposal to the Navy on an Amphibious Air Cushion Vehicle (ACV), called the SK-10, and is surveying Government facilities for recommendations for use. On March 24, in connection with the survey, the following Bell Aerosystems personnel were given a tour of the MAF facilities:

Major General Don O'Strander, Bell Aerosystems Advanced Planning
Rear Admiral R.K. James (retired), Bell Aerosystems Consultant
Mr. John Chaplin, ACV Engineering
Mr. Tony Brocato, Manufacturing

The following visitors were given a briefing and tour of the facility:

March 24 Rear Admiral Walter F. Schlech, Jr. Commander, Military Sea Transport Service, Atlantic Area, accompanied by Captain Jim Miller, MSTS, New Orleans

March 25 Captain Jack T. Bishoff, USN, Deputy Commander, Eastern Area, Military Traffic Management and Terminal Service, Brooklyn, New York.

Mr. Shigeru Otsuka, Executive Director, Japan Trade Center, New York, New York

March 26 Mr. Richard W. Kitschigin, Radio RIAS, Berlin, Germany

March 28 Senator Tran Ngoc Nhuan, South Vietnam and Colonel Ngugen Linh Chieu, Armed Forces Attache, Vietnamese Embassy, with State Department Escort, Mr. Taoul Georghin.

APRIL 7, 1969

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
DIR	~~J. T. Shepherd~~ Dr. Von Braun	B 4/15		

REMARKS

In response to the question on Notes of April 7 regarding successor to Charley Scott at UAH - no one has yet been selected nor are candidate names available I rather expect that they will have a bit of trouble filling the position.

V/B

RECEIVED APR 15 1969 DIR

CODE	NAME	DATE
AST-U		4/14/69

MSFC - Form 495 (Rev August 1963)

NOTES 4/7/69

B 4/7

NOTES 4/7/69 MOHLERE

Visiting Professor: Ben Cheerek, the MSFC representative from IO currently conducting a Systems Engineering Course at the University of Kansas, has returned for the mid-term break. Mr. Cheerek not only teaches the course to about 14 Doctoral candidates, but has prepared the course in addition. Its formal title is "Systems Synthesis and Analysis." Reports from Dean Rose, University of Kansas, are highly complimentary. Mr. Cheerek uses the teaching device of writing all lecture notes and issuing them in advance of his lectures. He has been called upon to widen his scope of endeavor somewhat by spot lecturing on his specialty throughout the Engineering Department. Additionally, he is in close touch with Jim Bradford on the matter of the Systems Engineering Course proposed by Dr. Mueller. He will complete the university assignment in May. ✓

Promotion of Dr. Scott, UAH: Dr. Charley Scott, Dean of Academic Affairs at the University of Alabama, Huntsville and a well-known figure in the local academic regime, has been promoted to Associate Dean of the Graduate School and Professor of Mechanical Engineering. These positions are in Tuscaloosa and will take effect in September. As I indicated in the last visit report pertaining to Tuscaloosa, Dr. Rodgers, current Dean of Graduate School, will retire next year at which time Charley will assume the post. I have prepared and dispatched a note of congratulations to Charley.

✓ E.M. Who will replace Scott?

B

B 4/7

NOTES 4/7/69 BALCH

S-II-7 - Current plans call for shipment to KSC on 4/15/69. This will provide for arrival at KSC on 4/21/69, in accordance with KSC's readiness to receive it.

S-II-8 - Preparations are on schedule for static firing on 4/8/69, as previously scheduled.

S-II-10 - Static firing is still scheduled for 4/16/69.

BOMEX - Sea trials on the ship "Rainier" were completed on 4/4/69. Signal Conditioning and Recording Device operated perfectly. Sea trials for the ships "Discoverer", "Mt. Mitchell", and "Oceanographer" are scheduled to be completed by 4/18/69, and sea trials for the ship "Rockaway" are to be conducted while en route to Barbados.

Target date for setting up NASA MTF field operations on Barbados is 4/24/69.

University Affairs - Mr. Herb. Quinn of the Office of University Affairs, NASA Headquarters, was at MTF this past week, and we discussed with him and representatives of Louisiana State University the continuation of the university's sustaining grant through the year beginning 9/1/69.

Edgewood Arsenal Project - The first shipment of explosives is scheduled to arrive today, and a 48-hour thermal stability test of the explosive mixture will be started immediately.

High Pressure Industrial Water Facility - The vendor's recommendations on the cavitation problem with the De Laval main pumps have been received and are under study.

Legal Affairs - Mr. Joe Brown, Assistant U.S. Attorney out of Jackson, Mississippi, was at MTF on 4/3/69. He has been assigned to represent the government in the damage suits that have resulted from static firings at MTF.

NOTES 4/7/69 BECKER

B 4/7

LUNAR PROGRAM - Reference: Your comments on NOTES 3/24/69 BECKER. You asked if a temporary lunar base using the S-IVB "Wet Workshop" was included in the lunar basing studies. Yes - Ben Milwitzky has information on the S-IVB "Wet Workshop" approaches to lunar temporary bases and its use in an evolutionary program. In fact, he included material charts on the McDonnell/ Douglas, Lunar Application of a Spent S-IVB Stage (LASS) and Lunar Application of a Spent S-IVB Stage in Orbit (LASSO) concepts in data given to STAC on March 23, 1969.

Several MSFC personnel, including myself, attended a dry run of the final presentation on the Lunar Planning Study at MSC on Tuesday, April 1, 1969. Indications are that MSC's presentation to the Management Council (April 8) will advocate deletion of LRV's in the recommended Mission Option. You will be further apprised of the results of this meeting and a subsequent meeting (Friday, April 4) at MSC, during our dry run to you on Monday, April 7. ✓

Short sighted!
2

NOTES 4/7/69 BELEW

B 4/7

ACE/ATM INTER-CENTER MEETING: The inter-Center meeting for developing an ACE/ATM agreement has been scheduled for April 10, at MSFC. This agreement will cover who handles configuration control, logistics, and the installation and maintenance of the ACE station.

FLIGHT HARDWARE ICD'S: A meeting was held on April 3, with Central Systems Engineering (CSE) and MSFC Panel Co-chairmen to discuss status of ICD's and determine the need for proceeding with interface meetings like the extensive one held for CSM-MDA last week. The panels will provide this office, through CSE, with scheduled release dates for each ICD, with a list of pacing items. These will be reviewed with the Project Managers for acceptability. Expeditious action will then be taken where warranted.

EXPERIMENT PRE-BOARD MEETING: After some delay, the Preliminary Requirements Review (PRR) pre-board meeting for Experiments M071/M073, Mineral Balance/Bioassay of Body Fluids, is tentatively set for April 17-18, at MSC. Due to potential impact on the MSFC developed Habitability Support System, representatives from MSFC will be asked to participate.

LM-A UMBILICAL STOWAGE AND MANAGEMENT: The stowage and handling of the two EVA umbilicals in the LM-A may be a sizeable problem. In view of the Apollo 9 experience, which showed that the astronauts had some difficulty with the relatively short CSM umbilical, the longer and larger diameter AAP umbilical may be difficult to stow and manage.

MSC TRAINER: A review and discussion between MSFC and MSC on trainers and training equipment was held last week. The objective is to make joint use of hardware to reduce the number of test articles in the program. Present proposals include using the Saturn I Workshop engineering mockup for the one "g" trainer, the Neutral Buoyancy test article for the Neutral Buoyancy trainers, and the present zero "g" mockups for MSC use in zero "g" training, utilizing the KC-135 aircraft. Assessment of these plans will be reviewed in mid-May.

ATM CONTROL AND DISPLAY REVIEW: An ATM Control and Display Design Review was conducted on April 3. A concurrent meeting, held in connection with C&D vibration requirements, indicates there may be problems in meeting vibration requirements. Isolation of some six or seven components may be necessary. The final decision on isolation of components will be made in mid-May when the C&D vibration tests being conducted at Bendix are complete.

ATM STRUCTURAL RACK: Manufacturing is complete on the ATM structural rack. The rack is now at Quality Lab for inspection. Inspection will be completed by April 9. Testing will not commence for approximately two months, due to the unavailability of the payload shroud that is to be tested with the rack.

NOTES 4-7-69 BROWN

B 4/7

F-1 ENGINE - An agreement has been reached by personnel from Rocketdyne, MSFC's Science and Engineering, Boeing-Michoud, Boeing-Huntsville, and MSC that no change is required in the F-1 engine cutoff thrust decay characteristics. Consequently, no further action will be taken to provide kits to incorporate the AS-503 shutdown on vehicle AS-505. ✓

CONSTAN NOTES 4/7/69

B 4/7

Nothing of significance to report.

B 4/7

NOTES 4-7-69 Downey

1. SUPER EXPLORER: Mr. Mitchell plans to have a working session in Washington on April 15 to discuss the Super Explorer Program. The Super Explorer is now considered by OSSA to be a program involving at least four missions. The emphasis in these discussions will be to define, to some extent, the experiment payloads for the follow-on missions. All our definition effort to date has been on the first payload, and this work is proceeding well. Mr. Mitchell's meeting will be a small one involving persons from MSFC, GSFC and OSSA. ✓

2. ASTRA: The optical stellar astronomy program has been given much attention during recent OSSA planning efforts. This planning is very fluid at present. Two courses of optical astronomy evolution are apparently being proposed, each leading to a 120" diffraction limited system. One course evolves along the unmanned line from the present OAO's into more advanced OAO's. The other course is the manned approach, which would involve modules that could be serviced and maintained by the Space Station or Space Base. ✓

3. EXPERIMENT MODULE STUDY: This effort is a proposed MSF-sponsored study to define an experiment module (or family of modules) which would be operated in conjunction with the Space Station. We had prepared and submitted a work statement to MSF. This work statement has been held up because MSF wanted to time phase the release of this RFP with the Space Station RFP. We now understand MSF plans to decouple this module study from the Space Station Phase B effort and to release the experiment module work statement as soon as possible. The work statement has been coordinated with OSSA. I consider this coordination very appropriate. ✓ Our Space Station and associated efforts can benefit from customer interest and involvement. ✓

NOTES 4/7/69 FOSTER

B 4/7

APRIL 11 - 13 MSF HIDEAWAY MEETING - On the agenda for presentation at the MSF hideaway meeting are the following items:

1. A summary review of the institutional plans as submitted by the three Centers.

2. Institutional plan general impact statements considering the new program changes i.e. (defer Sat IB vehicles 213 & subsequent, restart Sat V production, Sat. V launch rate of 3/yr. starting in FY-74 with 516, slip AAP program 3 months, concurrent launches of AAP & Lunar exploration).

3. A roles and missions presentation by MSF based on the Center Institutional Plans submitted earlier. Marshall's submission listed future programs that we were interested in obtaining major participation.

4. A five year support contractor plan for each MSF Center, We are preparing an input which reflects our requirements as submitted in POP 69-1 for currently approved programs only, because of the present uncertainty concerning new programs.

NOTES 4/7/69 GEISSLER

B 4/7

1. AAP Attitude Timeline and Experiments Control: A meeting was held March 28, attended by representatives of S&E-AERO, -ASTR, -ASTN, PM (IO), MSC, and Headquarters, to review the results of studies relating to the following actions assigned by the Mission Requirements Panel (MRP): (1) The pointing and stability problem, including a trade-off on possible pointing aids, is to be investigated; (2) The mission timeline requirements and capabilities are to be investigated. Results of these actions which are being published by the AAP Attitude Timeline and Experiments Working Group, are: (1) All of the experiment requirements as stated in the Experiment Requirements Documents, and as modified by the suggestions recommended to the MRP, cannot be accomplished by the existing WACS capability (the experiments most affected are S-019 "UV Stellar Astronomy," S-020 "UV/X Ray Solar Photography," and T-025 "Coronograph Contamination Measurement"); (2) Addition of a Flexible Scientific Airlock would satisfy most of the experiment pointing requirements, however, cost of development and integration may be prohibitive; (3) Modification of pointing requirements, or the experiments, by iterating the implementation problems with the Principal Investigators may allow some of the experiments to be flown within the existing WACS capability, however, investigation of the many possible experiment modifications was not considered within the above actions due to the time and resources available. Mr. Tweedy of Bellcomm has discussed the integration problems with the Principle Investigators, and suggested some modified modes to investigate; however, an assumption that some WACS propellant is available for experiment pointing would have to be made when considering these modified modes. The results of the second action show that the existing WACS capability of 220,000 #·sec would be required for the baseline mission, and hence, no propellant would be available to satisfy highly accurate experiment pointing requirements. ✓

2. Atmospheric Models: Mr. Gary Swenson of our Aerospace Environment Division recently visited Dr. L. G. Jacchia of Smithsonian Astrogeophysical Observatory, and Dr. Kenneth Champion of Air Force Cambridge Research Laboratories (AFCRL), to discuss research on atmospheric models at orbital altitudes. He obtained a copy of a new unpublished model being developed by Dr. Jacchia. We have examined this model, and our preliminary conclusions are that there is not a significant difference between the MSFC-modified Jacchia model and his new model. Since Dr. Jacchia bases his models primarily on tracking data obtained from Baker-Nunn cameras, he has very little data at altitudes less than 200 km. We anticipate receiving considerable low-altitudes data (140-200 km) from Air Force sources from which to develop the lower-altitude portion of our model. Mr. Swenson learned that about all of the atmospheric modeling capabilities of AFCRL are being used to reduce data from the two density research satellites launched in July 1968. AFCRL has agreed to furnish us these data shortly after they have been reduced. ✓

NOTES 4/7/69 GOERNER

B 4/7

OUTER PLANETS WORKING GROUP MEETING: (Reference Notes 3-31-69)
A meeting of the Outer Planets Working Group was held in Washington, D. C., on April 2, 1969. Mr. R. S. Kramer, OSSA, served as chairman, and attendees were from ARC, JPL, IITRI, OART, and GSFC. Those attending from MSFC were Dr. D. Hale (S&E-SSL-NP), Mr. C. Guttman (PD-SA-P), and Mr. B. Ellison (PD-DO-PM).

The following presentations were given during the meeting:

a. Mr. Niehoff, IITRI, presented data concerning specific mission requirements for first-generation orbiters and parametric data on orbiter payloads for the Titan III C/Centaur, 260/S-IVB/Centaur, and S-IC/S-IVB/Centaur launch vehicles. Some of the orbiters used a space storable propulsion system with an I_{sp} of 385 seconds. Mr. Niehoff also presented some data for a rendezvous mission to the moons of Jupiter.

b. Mr. Matthews, ARC, presented data on the modifications necessary to Pioneer F/G in order to accomplish either a Jupiter swing-by out-of-the-ecliptic or a Jupiter orbiter mission.

c. Mr. Casal, OART, presented data showing nuclear/electric spacecraft for orbiter missions to Uranus, Neptune, and Pluto.

d. Mr. Ellison, MSFC, presented data on the capabilties of the Saturn V and Saturn V/NERVA to perform the 1977 J-S-P and the 1978 J-U-N missions. These data showed gross payload capabilities; the science objectives for large payloads were not identified.

Data presented by MSFC were received with interest. OSSA desires further data on more ambitious missions, such as multi-payload Roman candle, Jupiter junction, etc. The science objectives for large payloads must be identified before the large payload capabilities of Saturn V and Saturn V/NERVA can be justified. A determination should be made on the space storable propulsion system availability during the 1976 - 1980 time period. The nuclear/electric spacecraft will not be available until after 1980.

Mr. Kramer will identify action items for the working group members after the PEP meeting.

NOTES 4-7-69 GRAU

B 4/7

NORTH AMERICAN-ROCKWELL: The Quality and Reliability survey of NR/SD Seal Beach was completed on March 27, 1969. A debriefing was conducted with the contractor and the resident office. There were fourteen discrepancies and four observations. The most significant findings were:

a. Questionable cleanroom operations and inadequate documentation at Los Angeles Division.

b. Inadequate detailed test procedures for the Product Repeatability Programs (component bench testing) at Downey.

c. Insufficient detailed inspection planning in some areas.

d. Poor workmanship in soldering of electrical connectors.

NR/SD was very cooperative, and in many cases corrective action was initiated at the time the discrepancies were called to their attention.

NOTES 4/7/69 HAEUSSERMANN B 4/7

Several anomalies occurred on S-IVB 504 as a result of the attempted 3rd burn using LOX and fuel lead for engine chilldown. The mission rule that was to cover this chilldown failure mode proved to be no good. The fuel lead was much too long, resulting in a rough start and hardware damage. Rocketdyne in the J-2 Engine PMRR proposed a new start sequence for S-IVB 505 which would require a 3rd burn attempt. There is no way this could be accomplished without hardware and software changes. S&E and IO met Friday, set the ground rules, reviewed the options, selected the most desirable to us, and assessed the impact. This will be presented to General Phillips by CSE on Monday, April 7. A final decision is expected at that time.

NOTES 4/7/69 HELLER

B 4/7

1. AAP Flight Experiment T-027: PD (Belew) has clarified the situation with the incorporation of several science experiments into our T-027 (contamination experiment) package. Approval and the first increment of funding have been received from W. Schneider (MSF). The science experiments are: S-073 for Gegenschein and zodiacal light measurements, PI Dr. Weinberg of Dudley Observatory and S-149 for meteorite detection, PI Dr. Don Tagget of Dudley Observatory. Len Yarbrough will initiate the necessary actions together with PD to accommodate these experiments on the extension mechanism of T-027. The management for S-073 which was previously assigned to MSC has been assigned to MSFC and the transfer is being carried out by PD.

2. Restructuring of SSL-S Division: Dr. Sieber and some of his co-workers were transferred to SSL and moved last week to SSL. I am in the process to restructure SSL-S as a Scientific Engineering Division in support of SSL's scientific missions and to provide the vital engineering interfaces to other S&E labs and other MSFC organizations, especially PD and PP.

3. Optical Contamination Program: Dr. Dozier and Messrs. Weathers and Naumann of SSL made a presentation on our Optical Contamination Program to Bruce Lundin and his Division Chiefs of OART. Bruce Lundin was impressed with our presentation and with the thorough approach to the contamination problems. OART realizes that this is a vital area for optical technology and for all of NASA's astronomy projects. The program has been assigned by Bruce Lundin to Milt Ames. It will be managed by Warren Keller and Art Reetz as a new area in the subprogram Environmental Factors for Space Vehicles. We'll follow up this presentation with funding requests through S&E.

NOTES 4-7-69 HOELZER

B 4/7

Nothing of significance to report.

NOTES - 4/4/69 - HUBER

B 4/7

1. PLANETARY PROGRAMS: The PSG "Planetary Exploration Panel" (headed by Don Hearth, OSSA) is presently considering options for outer planet missions, ranging from Titan III-class to Saturn V and Saturn V/nuclear. MSFC inputs have been requested, on missions that would be unique to Saturn V and Saturn V/nuclear capabilities. The MSFC participants will attempt to show the mission advantages of the Saturn V payload capability, but continue to show a MSFC interest in the smaller class missions, in addition.

2. SPACE STATION LOGISTICS: Earlier guidelines for the forthcoming Space Station Phase "B" studies specified a Gemini-derivative spacecraft plus Titan IIIM (or S-IC/S-IVB) for logistics. Following the recent meeting in Houston, the new (draft) work statement calls for consideration of "... initial logistics system derived from Apollo and Gemini spacecraft and Saturn and Titan launch vehicles." Operational studies and comparative analysis of advanced reuseable vehicles is also specified, for the long haul. Having the CSM question opened again, we have begun to re-examine means to accommodate cargo on Saturn IB/CSM flights.

NOTES 4/7/69 JAMES

B 4/7

1. Third S-IVB Burn for AS-505: As you recall at the Douglas meeting on April 2, both Rocketdyne and Douglas proposed a third burn experiment on AS-505. As a result of this proposal we have investigated with all elements of MSFC various methods of accomplishing this. This investigation reveals sizeable software and hardware changes irrespective of ground or on-board issuance of commands. More important, it was learned that due to the distances involved, only data transmitted through the IU will be received. With this limited data an effective evaluation of the third burn is impossible. As a result of this development, I convened a meeting in my office on April 4 to determine the best course of action to obtain as much meaningful data as possible from the 505 flight. It was determined that temperature data could be obtained by simulating the fuel and LOX lead after spacecraft separation and prior to the dump sequence. This can be accomplished by ground command and requires no hardware or software change. We are working out the details of the command sequence required as well as the Mission Rule change and will report status at today's LDX with Dr. Mueller and General Phillips.

2. MSFC Pre-Flight Review for AS-505 (April 15, 1969): Although I have attempted in the past to present problems only at the Pre-Flight Reviews, many of the items did not warrant the time taken by Center management. Consequently, I am reducing the presentation for AS-505 to about 3 or 3 1/2 hours. The attendance will be reduced such that the Tenth Floor Conference Room will accommodate the meeting. In preparation for your Pre-Flight Review, I held informal reviews on each stage during the past week with the prime contractors and S&E in attendance. No significant new problems were uncovered.

3. AS-504/S-II Oscillations: The S-II-8 static firing readiness review was held at MTF on April 3. The firing is still scheduled for April 8. The instrumentation and redlines were reviewed and agreed to by the Engine Office and ASTN as being adequate to evaluate conditions of the engine after the firing. Phase 1 of the Mini "A" and "C" Structures Test Program started April 1 as scheduled with completion projected for April 14. This phase will provide bulkhead response data before the AS-505 flight.

4. LH_2 Depletion Sensor Cutoff of S-IVB-508 during Acceptance Firings: The programmed partial usage of open loop P.U. operation on S-IVB-508 resulted in propellant consumption greater than that observed on previous S-IVB/V acceptance firings and a subsequent depletion sensor cutoff due to a propellant depression phenomenon. The acceptance firing program is being modified to prevent a recurrence by setting the P.U. processor cutoff at 2.7% in lieu of 2%. The usable LH_2 residual mass predicted for S-IVB-505 and similar residuals for subsequent stages plus the "G" loads in flight will prevent any possibility of depletion sensor cutoff.

NOTES 4/7/69 JOHNSON

B4/7

Work with University of Alabama - Huntsville - Messrs. Chase and Russell met with Dr. Thompson of the Research Institute to review status of on-going and planned work with them.

Of seven contracts in force at the time of our last review: (1) The Sustaining Research Grant renewal proposal is in Headquarters for review; (2) The History of the Saturn effort is just getting under way, it runs to November 1970; (3) Three contracts have been extended; (4) Extension of another is now being negotiated; (5) One will not be renewed at the completion of the current effort.

Of four firm proposals made: (1) Contracts or grants are now in force on two; (2) One is being held pending identification of funding source but is low priority in sponsoring labs program, (3) One will not be funded (Headquarter's decision not to support).

Of four draft proposals received: (1) Two are planned for FY-70 support, (2) Request for firm proposal has been sent to University of Alabama on one, funds are available in FY-69 program; (3) No funding source appears to be available for one.

Dr. Thompson will be in Washington for discussions with Office of University Affairs this week.

Power for Communications Systems on Mars Fly-by - (Reference your question on Notes 2/10/69 - copy attached.) Selection of the conversion system has not been completed yet. It is possible to derive adequate power for planned uses on board, with the reactor operating in an "idle mode," with relatively inefficient conversion systems. The key questions influencing selection are lifetime, material compatibility, reliability, etc. Currently, thermionic, thermo-electric and rotating machinery systems are being considered. A low level contracted study to define advantages of each and to identify related problem areas is now being planned. Astrionics personnel are continuing a low level in-house effort to accomplish the same objectives.

(Copy of Notes 2/10/69 to Drs. von Braun and Weidner only.)

NOTES 4/7/69 MOHLERE

B 4/7

Visiting Professor: Ben Cheerek, the MSFC representative from IO currently conducting a Systems Engineering Course at the University of Kansas, has returned for the mid-term break. Mr. Cheerek not only teaches the course to about 14 Doctoral candidates, but has prepared the course in addition. Its formal title is "Systems Synthesis and Analysis." Reports from Dean Rose, University of Kansas, are highly complimentary. Mr. Cheerek uses the teaching device of writing all lecture notes and issuing them in advance of his lectures. He has been called upon to widen his scope of endeavor somewhat by spot lecturing on his specialty throughout the Engineering Department. Additionally, he is in close touch with Jim Bradford on the matter of the Systems Engineering Course proposed by Dr. Mueller. He will complete the university assignment in May. ✓

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✓ E.M. Who will replace Scott?

B

B 4/7

NOTES 4/7/69 MOORE

ACE Hardware for ATM. We have been working in cooperation with elements of Program Management, who, in turn, is working with Headquarters to obtain a decision on the selection of a particular ACE Station to be assigned to MSFC for ATM Checkout Operations. The ACE Station and complete definition of the hardware included with the basic station is overdue against the ML-15 schedule. The urgency for this definition is to allow the elimination of alternate studies, designs, and planning based on speculation of what hardware may or may not be transferred to MSFC with the ACE Station and also to allow sufficient time for the procurement cycle for required new hardware. We are continuing to work with Program Management to press for this important decision. ✓

ATM Weight Status. Recent weight estimates of ATM items have caused the total estimated weight to be very close to the official control weight of 21,700 pounds. The most significant increase (approximately 700 pounds) has come from the electrical cables. Increases of 10 to 50 pounds have also occurred on several black boxes. Efforts are underway to refine the present estimates and make weight reduction changes which would be acceptable in so far as the cost, schedule and performance impacts. ✓

NOTES 4/7/69 MURPHY

B 4/7

System Safety Review of Nuclear Aerospace Research Facility:

A System Safety Review of the Nuclear Aerospace Research Facility (NARF) at the General Dynamics Plant (Fort Worth, Texas) was conducted on March 26-28, 1969. The Review was conducted in response to a request from Astronautics. General Dynamics is the S&E-ASTN Contractor and is to provide test data to be used for design of nuclear vehicles. The LH2, GH_2 systems, operational controls, test personnel experience and related operating procedures were evaluated for safety hazards associated with nuclear reactor tests. NASA Headquarters will evaluate the potential radiation problems. This Review was required due to complaints from the local Air Force (Carswell Air Force Base) of potential radiation and LH_2 handling problems. At present, the construction of the Aerospace Systems Test Reactor (ASTR) Facility (approximately 80% completed) is stopped and other reactor tests by General Dynamics were recently terminated by the Air Force. The comprehensive review revealed a test discipline thoroughly cognizant of the techniques and the necessary controls for safe handling of LH_2. We concluded that the requirements established by General Dynamics will positively control the potential hazards associated with tests involving LH_2, and therefore would not substantiate previous complaints that the test operators would be unsafe.

Operational Readiness Inspection of Accelerators:

An Operational Readiness Inspection (ORI) of the Plasma Accelerator and Light Gas Accelerator in the Hypervelocity Laboratory of the Space Sciences Laboratory was completed last week. It was conducted at the request of Jim Downey (S&E-SSL) and was accomplished with little or no interruption to them. A small group of experts in this field comprised the ORI Committee with representation from ME Laboratory, Facilities Office, Space Sciences Laboratory, Science and Engineering Systems Safety Office and was chaired by a member of this Office. The operators of the accelerators are considered highly competent and very safety conscious, however, the objective review given by the ORI Committee provided SSL with a number of useful recommendations and suggestions not previously considered that will improve the overall safety posture of the operations.

NOTES 4/7/69 NEWBY

B 4/7

Negative Report.

B-17

NOTES 4-7-69 SIEBEL

1. ATM: The Structural Test Article was completed and shipped to S&E-QUAL on April 2, 1969. Strain gauges will be installed when the article is returned to us and as documentation becomes available.

2. Cryogenic Gas Storage System (CGSS) - AAP Service Module

Two of our engineers participated with Houston personnel on March 31, 1969, through April 1, 1969, in making a manufacturing process audit at Bendix's Life Support Division, Davenport, Iowa, on the CGSS for AAP. The effort was preparatory for a critical design review (CDR) held at Bendix by Houston and North American Rockwell on April 1-3, 1969. Bendix has a $7,000,000 contract from MSC to build approximately 15 high pressure storage bottles over a two-year period ending approximately January 1970. MSC plans to transfer monitoring responsibility of the program to NAR. The manufacturing audit team, through Cliff Hall, MSC-AAPO, submitted 13 RID's (review item disposition) to the CDR committee related to material cleaning and storage, welding, brazing, tube flaring, facility installation, and processing documentation. MSFC personnel also agreed to provide Bendix with several Saturn V processing documents which are applicable to the CGSS program.

NOTES 4/7/69 SPEER

B 4/7

1. Orbital Debris: We have completed the coordination of the joint MSC-MSFC reply to Gen. Stevenson regarding orbital debris for future Apollo missions. It is our position that for lunar landing missions the orbital debris problem does not warrant special contingency measures (such as controlled re-entry into ocean areas) in the event that parts of the vehicle remain in earth orbit.

2. Operations Support Requirements: We had a thorough discussion with Porter Brown and others from Gen. Stevenson's office on the future concept and mechanism of establishing ground network and data requirements through the Program Support Requirements Document (PSRD). The current PSRD has many recognized shortcomings, and we support Brown's idea of delegating some of the detailed requirement coordination/documentation to the Centers. The main reason for continued difficulties in this area is the varying interface relationship with DOD, OTDA and the unmanned programs.

NOTES 4-7-69 Stuhlinger

B 417

MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY (HONOLULU, MARCH 31 - APRIL 4 1969): This symposium featured four review -type presentations, and a large number of short papers on current research. The survey papers dealt with energy transport through the solar atmosphere; non-gravitational forces, acting upon comets; infrared astronomy; and preliminary results of OAO II. The short papers covered many subjects, including celestial mechanics, radio astronomy, interstellar matter, stellar atmospheres, statistics of quasi-stellar objects, pulsars, and stellar evolution.

In all these areas, vigorous and very fascinating research is under way, both observational and theoretical. Progress during the past few years has been impressive, partially because of modern sensors and electronic techniques. Astronomers are most anxious to make more and more precise observations soon. Repeated pleas were made for more flight opportunities on airplanes, balloons, rockets and unmanned satellites, with short implementation times. Very obviously, astronomy is presently in a fertile phase with many new ideas and theories being proposed, and astronomers are impatient to see the new thoughts proven or disproven. Observations involving UV, X-rays, gamma rays, and cosmic rays rank high on the list of urgent observations, but studies in the infrared and radio frequency regions are gaining quickly in importance. In all observations, high spectral and high spatial resolutions are of great significance, except for early survey-type observations which will map the sources of radiations according to location and brightness, and which require large and heavy, but relatively unsophisticated instrumentation.

The star performer of the symposium was OAO II. Kupperian (Scientific Project Director, GSFC), Purcell (Project Manager, GSFC), Code (PI, U. of Wisconsin), and Davis (PI, Smithsonian Astrophysical Observatory, SAO) gave reports. Although scientific observations have not been evaluated to any great extent, general results can be indicated: The distribution of UV stars is different from that assumed so far; hot stars are hotter than previously believed; they lose energy at a higher rate, and their lives are shorter; and there is less interstellar matter than previously anticipated. These results support the "big bang" theory, in contrast to the steady state theory. Dr. Code stated that "the results of OAO II will have an impact on all phases of optical astronomy."

Three of the four SAO instruments, and practically all of the U. of Wisconsin instruments, are working well. Pointing accuracy, designed for 1 arc minute, has been one-half arc minute so far. There is a strong desire among astronomers to continue the line of automated, OAO-type astronomy satellites, possibly to include eventually diffraction-limited 3 m (120") telescopes. The symposium included field trips to Haleakala on Maui (10025 ft.) with observatories of SAO, U. of Illinois, and U. of Hawaii, and to Mauna Kea on Hawaii (13800 ft.) with observatories of U. of Hawaii, and of NASA (88" mirror, not yet completed).

I had many opportunities to talk with astronomers during the symposium and the field trips, and I realized again that a very urgent need exists for closer contacts between astronomers and the manned space flight program.

NOTES 4/7/69 BECKER

B 4/7

LUNAR PROGRAM - Reference: Your comments on NOTES 3/24/69 BECKER. You asked if a temporary lunar base using the S-IVB "Wet Workshop" was included in the lunar basing studies. Yes - Ben Milwitzky has information on the S-IVB "Wet Workshop" approaches to lunar temporary bases and its use in an evolutionary program. In fact, he included material charts on the McDonnell/ Douglas, Lunar Application of a Spent S-IVB Stage (LASS) and Lunar Application of a Spent S-IVB Stage in Orbit (LASSO) concepts in data given to STAC on March 23, 1969.

Several MSFC personnel, including myself, attended a dry run of the final presentation on the Lunar Planning Study at MSC on Tuesday, April 1, 1969. Indications are that MSC's presentation to the Management Council (April 8) will advocate deletion of LRV's in the recommended Mission Option. You will be further apprised of the results of this meeting and a subsequent meeting (Friday, April 4) at MSC, during our dry run to you on Monday, April 7. ✓

Sheet 7 sighted! B

April 14, 1969

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. von Braun, DIR

DATE APR 21 1969

FROM Director, Administration & Technical Services

SUBJECT Your comments to my Notes of 4/14/69 concerning GAO Audits - Defective Pricing (attached)

Ordinarily, the GAO provides an audit report to NASA, to which the Agency must formally respond. Such reports are usually not preceded by any formal discussion of specific findings between the GAO and the Agency.

In the case of the Defective Pricing Audit on the NAR F-1 Engine Contract, however, the GAO has asked that the local auditors prepare a "discussion paper" which will outline the findings for mutual discussion of GAO and MSFC before the GAO report is finalized.

Dave

David H. Newby

1 Enc:
a/s

RECEIVED
APR 22 1969
DIR

MSFC - Form 488 (August 1960)

4/14/69 - NOTES - NEWBY

B 4/15

AWARDS:

Some 15 checks and letters were received from the Inventions and Contributions Board, representing awards based upon the publication of several NASA Tech Briefs of MSFC innovations. The checks and letters were referred to Leroy Aderholt of the Incentive Awards Office for distribution.

R&D PROGRAM AUTHORITY - 1966:

As of January 31, 1969, FY 1966 program authority expired for obligational purposes. Headquarters requested during the week, a report for current unobligated balances with the intent of withdrawing such balances. Of the $1,561,000,000 received (peak year for MSFC R&D programs), only $183,000 was currently unobligated, this being primarily due to obligational adjustments associated with contract closeouts.

GAO AUDITS - DEFECTIVE PRICING:

We have been informally notified that GAO/Atlanta is applying pressure to local GAO auditors to get out a discussion paper on their alleged defective pricing by NAR on the F-1 contract.

→ Dave N.

Head does that mean? P

PRE-RETIREMENT SEMINAR:

Approximately 140 employees attended one or more of the sessions of a Pre-retirement Seminar accompanied by 25 wives or husbands of employees. Most comments received from participants were favorable.

HIRING AUTHORITY:

A teletype was received from Headquarters freezing all hiring of permanent employees in OMSF. Marshall's two commitments for PhD's will probably be affected by the freeze action.

"Subject to Dr. Paine's personal approval"

B.

NOTES 4/14/69 BALCH

B 4/15

S-II-7 - All preparations are on schedule for shipment to KSC on 4/15/69.

S-II-8 - Stage was successfully static fired on 4/8/69 as planned with early center engine cut-off to eliminate the low frequency oscillation of the stage that has been occurring toward the end of its burn. Analysis of the results of the static firing indicates that the oscillation problem was eliminated and that the center engine was not damaged by the test.

S-II-9 - Stage arrived at MTF on 4/10/69 and was installed in the A-1 Test Stand on 4/11/69.

S-IC-10 - All work is on schedule for static firing on 4/16/69, as previously scheduled.

BOMEX - Installation and checkout of the Signal Conditioning and Recording Devices have been completed on the ships "Rainier", "Discoverer", "Mt. Mitchell", and "Oceanographer." Sea trials on the first two of these ships have been completed and will be completed on the other two this week. The "Discoverer" departed Gulfport this morning for Miami and will proceed from there to the BOMEX operations area on 4/23/69. The "Rainier" is scheduled to depart Gulfport today for Barbados. The "Oceanographer" and the "Mt. Mitchell" are scheduled to depart for Barbados on 4/22/69 and 4/23/69, respectively.

Edgewood Arsenal Project - The first shipment of pyrotechnics has arrived at MTF. The first live testing will begin this week.

Public Affairs - On Wednesday evening, 4/9/69, I attended a dinner at the Gulfport Yacht Club honoring government agencies and the ships' crews participating in the BOMEX Project. The dinner was sponsored by the Gulfport Chamber of Commerce and the Port of Gulfport. Other attendees included U.S. Representative Willima Colmer, Mississippi Fifth Congressional District, and Rear Admiral Don A. Jones, Director, U.S. Coast and Geodetic Survey, Rockville, Maryland, who spoke briefly to the group. I also spoke to the group thanking the city and Port of Gulfport for their support in the project and their hospitality.

On Thursday, 4/10/69. I attended the State of Mississippi's Conference of Marine Sciences in Jackson, Mississippi. The conference was called by Governor John Bell Williams and sponsored by the Mississippi Agricultural and Industrial Board.

NOTES 4/14/69 BECKER

B 4/15

LUNAR ROVING VEHICLE

The Lunar Roving Vehicle Contractor Orientation Meeting with Bendix and Grumman will be held at MSFC the week of April 21, 1969. ✓

Data was furnished to NASA Headquarters, MAL, regarding the status of the Lunar Roving Vehicle technology on April 7, 1969. Mr. Milwitzky was briefed on the data furnished. This data is part of a presentation to be given to the Lunar Mission Planetary Board by Mr. Milwitzky on April 11, 1969. ✓

NOTES 4/14/69 BELEW B 9/15

ATM MEETING ON BALL BROTHERS QUALITY SURVEY: A meeting was held April 9, at MSFC, to discuss the discrepancies remaining from the quality survey conducted August 5-8, 1968, by QUAL. Thirteen of the 14 discrepancies were resolved at this meeting without cost impact. It appears that the remaining item can be resolved with only minor cost impact.

SATURN I WORKSHOP: McDonnell Douglas Astronautics Company - Western Division, has brought the 212 stage (1st Workshop) out of storage, and it is in the process of disassembly. The removal of the J-2 engine was completed on April 9.

MARTIN CONTRACT: Change orders were processed this past week to reduce the scope of the Martin Contract by an estimated $10.0M. This is the action resulting from the guideline that the value of the negotiated Martin Contract ($98.2M - $89.9M Payload Integration; $8.3M ATM Control & Displays) is the maximum available funding through runout. This $10.0M will be reserved for changes in the form of program critical items not yet completely identified.

CONTAMINATION: A meeting was held April 10, with representatives from AAP, CSE, and SSL to discuss progress of contamination activities. An action was taken by CSE and SSL to prepare a working group charter and contamination control plan for the entire AAP cluster, and CSE is to prepare a milestone chart of the contamination working groups outputs.

LM-A CONTRACT FACT FINDING MEETINGS: Three days of meetings were held with Grumman last week to review their cost proposal, cost reductions, and the detailed scope of work for the LM-A Contract. We plan to proceed with the prenegotiation conferences (April 17 at Headquarters and subsequently to definitize the LM-A Contract.

APOLLO LM-2 STATUS: An operator error on the Apollo LM-2 vehicle (one LM to be assigned to AAP, but now being used for Apollo tests at MSC) caused the loss of two RCS tanks during de-tanking at MSC. A vacuum line was accidentally connected to the RCS propellant system, causing both of the Module "B" tanks to collapse. This incident resulted in the loss of part of the hardware resources we were depending on for the AAP and we may have to buy additional Apollo-common items to replace these tanks.

NOTES 4-14-69 BROWN

B: 9/15

F-1 ENGINE - Mockup engine FM-105 (a hard mockup) has been declassified and shipped to the Paris Air Show. The engine is expected to return to MSFC in late June for installation in the Alabama Space and Rocket Center.

J-2 ENGINE - To evaluate the reduction in center beam oscillations on the S-II stage, the center engine was cutoff 87 seconds prior to the cutoff of outboard engines during the S-II-8 acceptance test on April 8, 1969. A water spray system was used to prevent damage to the center engine from radiation. A post-test review of the test data has shown no engine damage from heating or vibration in the unfilled, unpressurized state. This solution to the oscillation problem is acceptable from an engine viewpoint.

CONSTAN 4-14-69

B 4/15

Nothing of special significance.

B 4/15

NOTES 4-14-69 Downey

1. ASTRONOMY PLANNING: I reported on ASTRA last week and indicated that the planning in the optical stellar astronomy program is very fluid. My entry in the Notes of 4-7-69 is now out of date, at least for the moment. In connection with the astronomy planning activity of the PSG, Dr. Stuhlinger has been asked to submit plans for two optical astronomy programs, each having the 120" diffraction limited telescope as an end objective. One approach is referred to as the "bold" program and involves a relatively early flight hardware commitment to build a 120" diffraction limited telescope for flight in 1980. The other, more conservative program approach includes an intermediate flight, primarily for technology purposes, of a 120" non-diffraction limited system in 1976 or 1977. The manned vs. unmanned issue has not been highlighted in the instructions to Dr. Stuhlinger. My office is preparing the required material.

2. SPACE MANUFACTURING AND TECHNOLOGY EXPERIMENTS: Other Centers and various Headquarters groups are indicating an increased interest and activity in space manufacturing and technology experiments for the Space Station. We must remain active or we will be in danger of losing our present Center advantage in space manufacturing, which has resulted from the early initiative taken by ME Laboratory. I think we need to broaden our space manufacturing approach to include some fundamental investigations, as well as the manufacturing development experiments, in order to be in tune with present thinking in Headquarters. Dr. Siebel and I are involved in discussions on this matter, and I feel sure we can develop an approach which will be both practical and appealing to Headquarters. I am also in contact with Dr. Bill Johnson's office regarding this area of activity.

Ptel B

NOTES 4/14/69 FOSTER

B 4/15

MANPOWER PLANNING - During the review of our recent MSF Work Package (TWP) 69-1 submission with Center management, it was requested that a more meaningful approach for manpower planning be utilized. The present TWP system required a large volume of manpower data based on one program option. The suggested approach was to consider various program contingencies, but to develop the manpower data in less detail. This approach would provide Center management with a better insight into the various alternatives for utilizing our manpower than the present TWP system.

APPOINTEE FOR ASSISTANT SECRETARY OF AIR FORCE FOR R&D - We have been informed that Mr. G. L. Hansen, formerly Director, Launch Vehicle Programs, General Dynamics/Convair, has been appointed as Assistant Secretary of Air Force for Research and Development.

As Director of Launch Vehicle Programs at GD/C, he was in charge of all space activities including the SLV (Atlas Space Vehicle) Atlas E/F, and Centaur.

"PHASING DOWN" STUDY - As you know, we are confronted with a reduction in workload at our prime contractors' plants. We are also concerned with reducing the cost of Saturn vehicles and yet maintain a reliable vehicle. In an effort to gain insight into this problem, representatives of this office visited General Dynamics/Convair to learn of their experiences over the past 10 years.

GD/C has had large reductions of personnel and major reorganizations, yet have maintained the key skills to successfully support their programs. They have reduced their workforce from a peak of over 30,000 people (1961) to a present strength of slightly over 13,000.

We plan to prepare a report outlining the GD/C experience, specifically regarding their engineering manpower, organizational structure, and workload (types and number of programs) over time.

Good idea!
B

NOTES 4/14/69 GEISSLER

B 4/15

1. S-II Longitudinal Oscillations: Our simulation of the longitudinal oscillation anomaly observed on AS-503 and AS-504 has progressed to the point where we are confident that the results basically explain these flight conditions. The conclusions are: (1) The onset of the instability and damping of the oscillation is of a linear nature, created by the LOX suction line and the crossbeam LOX bulkhead structural mode; (2) the limit cycle and other non-linear behavior characteristics are caused by the nonlinearity associated with bubbles at the pump inlet; and (3) the difference between oscillations on AS-501, AS-503, and AS-504 can tentatively be explained in terms of changes in structures mode frequencies, NPSH, and other operating conditions. We understand that N.A.A. presented to you the same general results as ours, using a slightly different model and including the same nonlinear bubble compliance. We have been in contact with N.A.A. since our presentation at the AS-504 Flight Review, at which we postulated the existence of the nonlinear bubble in the lox line. We are to meet with N.A.A. this weekend to compare our results. We are presently using this model to study the effects of early center engine cutoff for AS-505. Preliminary results of this study are expected next week.

2. Integral Launch and Re-entry Vehicle: The reusable space shuttle is neither an airplane nor a conventional launch vehicle. Whereas aircraft are normally flown with static stability and aerodynamic control surfaces, the launch phase of the shuttle will be flown unstable and controlled with the propulsion engines, as in space vehicles. The high degree of geometric asymmetry introduces radically different aerodynamic, structural, and control characteristics, in pitch and yaw. This also leads to strong cross-coupling effects. Consequently, our Aerophysics Division is already involved in a design program, both analytical and experimental. This is a cooperative effort with the prime contractors, PD, and the Space Shuttle Task Team, to generate aerodynamic loads and forces, thermodynamic properties, acoustics, and aeroelastic aerodynamic effects. The contractor's experimental wind tunnel programs are being supplemented with in-house work in our 14-inch tunnel, particularly emphasizing tank loads at present, in order to establish confidence in mass fraction predictions. Slender, lifting, re-entry bodies have been developed by Langley, Ames, Edwards, the Aerospace Industry, and the Air Force. Although so far we have not followed closely all technical areas of reentry vehicle design, we believe to be well qualified to accept a strong role in the development of a sound concept, which meets the multiple requirements imposed by the overall system.

3. National Science Foundation Seminar for Outstanding High School Math and Science Students: In cooperation with Public Affairs Office, Mr. Jerome Redus of our Astrodynamics and Guidance Theory Division gave a presentation entitled "Math and Space" to a group of outstanding high school math and science students from the Memphis, Tennessee area. This affair, sponsored by the National Science Foundation, is for the purpose of acquainting outstanding students with specific tasks being performed in various technical fields, the aim being to encourage their entry into these fields. Mr. Redus's presentation aroused a high level of interest among the students.

4. Lunar Surface Monograph: The Lunar Surface Model Monograph, which originated in our Aerospace Environment Division for OART's Space Vehicle Design Criteria Office, has been finalized and will be submitted to OART. This publication is one of a series of 29 monographs in the areas of environment, structures, guidance and control, and propulsion, which are to be published as NASA special publications.

B 4/15

NOTES 4-14-69 GOERNER

PERSONNEL: On March 27, 1969, Horst F. Thomae was awarded his Doctorate in Aerospace Sciences by the University of Berlin, Berlin, Germany. Dr. Thomae has returned from Berlin, and will assume his new duties as Chief of the Performance and Flight Mechanics Division, Preliminary Design Office. ✓

Congratulations!

B

NOTES 4-14-69 GRAU

B 4/15

1. SATURN V CONTAMINATION INVESTIGATION: This Laboratory's investigation of contamination problems associated with the various Saturn stages has led to the conclusion that the basic requirements and specifications are adequate. In most cases, the contamination problems appear to result from inadequate implementation of specifications and procedures after final cleaning, during such operations as assembly, testing, system repair, and modification kit installations. A plan of attack has been formulated which includes an on-site evaluation of each stage contractor's general awareness in this area; evaluation of his procedure and specification implementation during scheduled and unscheduled operations; establishment of a contamination surveillance team at each site consisting of one member from NASA, the contractor, and the resident government inspection agency; establishment of an S&E-QUAL team to be technically cognizant, interface with the on-site team and assist in on-site evaluations; and appointment of a representative in each stage office to expedite corrective action as recommended by the S&E-QUAL and on-site teams. The plan has been forwarded to Dr. Farish's office for coordination with Program Management.

2. SA-505 CERTIFICATE OF COMPONENT QUALIFICATION STATUS:

Stage	Required	Signed	Open
IU	72	72	0
S-IVB	215	214	1
S-II	303	303	0
S-IC	143	143	0

The remaining open item will be completed and signed off prior to launch.

NOTES HAEUSSERMANN 4/14/69 B 4/15

1. In-House Testing: A plan was presented to S&E management on April 4 which recommended static firing the OWS stages and performing AAP-2 integrated testing at MSFC. This plan was adopted for recommendation by Program Management and was discussed at the Management Council Meeting April 10. The result is that MSFC needs to be ready for a briefing to Headquarters in 60 days. The briefing should cover how MSFC would conduct the testing and the impacts of doing it at KSC or other sites prior to delivery at KSC. We intend to get together with Mr. Kroeger this week to assign the action items for preparation of this Headquarters briefing.

2. CSE Move to Temporary Quarters: In order to become operational at the earliest possible date by being physically located together, we have agreed to take temporary quarters in Bldg. 4666 (Test Laboratory). It appears that this will be a satisfactory arrangement until space can be made available in Bldg. 4610 (Astronautics Laboratory). Assuming adequate telephone support, the 4666 area should be available for occupancy by April 28.

NOTES 4/14/69 HEIMBURG B 4/15

1. S-II STAGE AFT LOX BULKHEAD MODAL TEST The aft lox bulkhead modal test (Phase I) was completed 4/8/69. The objective was to determine the axisymmetric modes of the bulkhead as a function of propellant levels that existed on -504 during longitudinal oscillation. Tests were made at 10 levels with four at the level corresponding to that at the start of the oscillation period. Dwell tests were run at each predominant mode between five and 50 cps. Thirty-two data channels were recorded on oscillograph thus giving us a head start on analysis pending receipt of computer data expected to be available on 4/21/69. The test stand is being prepared for Phase II testing (Combined Center Engine/Thrust Structure/Aft Lox Bulkhead) due to begin on 6/1/69.

2. S-II-8 STATIC FIRING S-II-8 static firing with early center engine cutoff was successfully completed 4/8/69. Initial visual inspection of engine reveals no damage. Temperatures on outboard engines and center engine, after center engine cutoff, did not exceed 70°F and 0°F, respectively, during remainder of the burn. Preliminary review of data indicates that the 17 - 18 Hertz oscillation was reduced by one order-of-magnitude over similar data on S-II-7. A second static firing will not be necessary and stage will be removed from test stand.

3. S-II CENTER ENGINE ANOMALY INVESTIGATION Testing of the center engine lox feedline to determine the resonant frequencies has been completed. The resonant frequency varied from 17.5 to 24 Hz depending upon turbopump operating conditions. The frequency was found to increase with increasing lox pump inlet pressure and decreasing mixture ratio. At S-II anomaly inlet pressure and mixture ratio conditions the line frequency was found to be 24 Hz. The test stand was changed over to the outboard lox suction duct for one static and four dynamic pulse tests on this configuration.

4. AAP LUNAR MODULE (LM-A) UMBILICAL HANDLING Grumman Aircraft Engineering Corporation (GAEC) presented recommendations on 4/8/69 for tests at MSFC to determine feasibility of stowing and handling Extra Vehicular Activity (EVA) Umbilicals. Two stowage locations and crew member orientation for handling will be evaluated. GAEC will provide spherical umbilical containers for use in the test program. A significant interface problem exists with MSC as they are to supply the umbilicals. To the best of our knowledge, a contract between MSC and a supplier does not exist.

5. SATURN I WORKSHOP As a result of our disapproval of 21 drawings (of a total of 215 drawings) for Saturn I Workshop hardware due to the use of stress corrosion susceptible alloys, a meeting was held with MDAC personnel to resolve the problems. Changes were made in several components and MDAC will provide additional data to substantiate the use of these alloys in the remaining components. We received excellent support from Bill Simmons and his people and, apparently, got the attention of the MDAC personnel.

6. GENERAL Mr. John Admire, of our Structures Division, recently completed his oral examination of his dissertation paper entitled, "Non-linear Fluid Oscillations in a Partially Filled Axisymmetric Container of General Shape," at the university of Alabama. Mr. Admire will receive his doctoral degree in Engineering Mechanics on June 1, 1969.

NOTES 4/14/69 HELLER

B 4/15

1. Real Time Solar Magnetograph (RTSM): On April 9/10 I went with several members of SSL and Dr. Brueckner of NRL to a contract review at Electro-Mechanical Research, Inc. (EMR) in Sarasota, Florida of the electronics package of the RTSM. I was well impressed with the work at EMR in connection with the Uvicon picture tube system flown successfully on OAO II and with the SEC (secondary electron conduction) tube system being prepared for the OSO H flight. The experience with the other systems will be helpful for our RTSM which uses also an SEC tube. The electronics package is due for delivery in August or September 1969.

The RTSM is one of SSL's most promising solar astronomy projects. It is in direct support of Apollo for solar flare prediction and of ATM for prediction of the expected strength and location of anticipated flares. ESSA has requested to obtain our results as soon as we start operating. Since all phenomena of the active sun are connected with magnetic fields, our Real Time Solar Magnetograph is expected to contribute to the explanation of many solar phenomena. Our results will be of value to the scientific evaluation of the ATM experiments. The fact that it is a joint MSFC/NRL scientific project is based on the desire of the PI of NRL to utilize the results for the scientific evaluation of the ATM UV and XUV experiments. A similar desire has been expressed by other PI's. All aspects of the RTSM proceed quite well: The construction work by 'Maintenance' on the Tower is near completion, and the telescope dome and the 30 cm telescope are mounted on the tower. A 30 cm prefilter for rejection of all solar radiation with the exception of a 300 Å bandpass is on order (this is the largest filter of its kind ever built); a hydrogen-alpha telescope from Spectrolab has just arrived and it will be mounted on and aligned with the 30 cm telescope; the video and audio communications system between Comp, SSL (4481 and 4331), the Tower, and the Communications Building are being installed; the Zeiss 0.15 Å birefringent filter is on hand and has been checked out by detailed measurements at Kitt Peak (this is the only filter of its kind in existence); the specialized optics with the magnetic analyzers is being built at NRL; and the contract for the electronics (239K) is in effect between NRL and EMR (the review at EMR was in connection with this). The Computation Laboratory is well on the way in developing the needed hardware and software for data reduction. The UNIVAC 1108 will be utilized for this project in a rather complicated manner; however, all interfaces appear to be developing very satisfactorily. Dr. Mona Hagyard (SSL) has applied and obtained approval for one week's observation at Kitt Peak in July 1969. The results of these measurements are required to firm up our theory and the software program to be used for the data evaluation. Dr. Hagyard's previous presentation of a paper (jointly with Dr. Brueckner) at the Solar Physics Meeting of the American Astronomical Society in Pasadena on February 18, 1969 was well received and is a good start for our adventure in solar astronomy with hopefully many future publications. ✓

Shep Please arrange a good briefing on this. Principles, design etc. B

NOTES 4-14-69 HOELZER

B 9/15

Nothing of significance to report.

NOTES 4/14/69 JAMES

B 4/15

1. S-II Oscillations: The full duration static firing of S-II-8 was successfully accomplished on April 8, 1969, as scheduled with center engine cutoff and outboard engine cutoff occurring at 299 seconds and 384 seconds as planned. Data reviewed thus far indicates the 18 Hertz oscillation on the center engine mount was reduced by a factor of 10 from 0.8 G to 0.08 G. The center engine thrust chamber appears to have seen no more than 60°F and inspection/leak checks reveal no damage. We will cover this subject in detail at your Preflight Review.

The Mini A Aft LOX Bulkhead Dynamic Test has been completed and the data obtained was very close to predictions. Preparation for the other three phases of the Mini A and C Structures Test Program will get underway this week with beginning of testing projected for early June.

2. S-IVB Stage LH_2 Low Pressure Feed Duct: A one-inch crack was noted in the center bellows of the lower half of the S-IVB stage LH_2 feed duct after the static firing of stage 508 (approximately 450 seconds duration). Preliminary indications are that the crack was caused by "low stress, high cycle life." Two other failures in the LH_2 duct have recently occurred on the S-IVB battleship stage at MSFC. One failure occurred after 2200 seconds of firing and was a crack in the upper bellows of the lower half of the duct. The other failure is still under investigation but is believed to be a crack and it occurred after 1200 seconds of firing time. MDAC has started a redesign for the LH_2 duct which will probably include multiple bellows. The lower half of the LH_2 duct on S-IVB 505 has been replaced with a new duct that has not been through a static firing in order to reduce the risk of a fatigue failure on the Apollo 10 mission.

A test program is being planned by MDAC to test a LH_2 duct to better understand the failure mechanism and to determine the safety margin in the existing design. The results of the test program will support flights AS-506 and subs until a redesigned duct is available.

3. Apollo 10 Flight Readiness Test (FRT): FRT was completed successfully last week with only minor Launch Vehicle problems encountered.

4. AS-507 Software Changes: General Phillips has asked to be briefed on two LVDC software changes with a first effectivity of AS-507. He has not established a time yet. Our 4/1/69 notes to you covered the software change which will be implemented on AS-507 to eliminate the need for navigation update by ground command to enable spacecraft guidance takeover for Translunar Injection in the event of a L/V ST-124M platform failure. We are also improving the way our software is programmed and assembled for AS-507 through a "Modular Assembly" concept. This concept will reduce the time to make and verify late software changes. The LVDC memory will be used more efficiently thereby making more of the existing LVDC memory available for future changes.

5. S-IC-10 Static Firing: S-IC-10 static firing is scheduled for Wednesday, April 16, 1969.

NOTES 4/14/69 JOHNSON

B 4/15

Forecast of FY '69 Unobligated Carry-over - At the request of Mr. Paul Cotton in the Resources Management Group of OART, we have reviewed the procurement status of the FY '69 OART program and have advised him that our estimated carry-over will be about $3.0M. In deriving the estimate we have attempted to arrive at realistic span times for the procurement actions still remaining.

More than 50% ($1.8M) of the carry-over will be in the Propulsion Area. This residual is directly related to changes in direction of program plans and content in FY '68 which delayed obligation of the '68 authority until February of this year. We are working closely with Del Tischler to define the '69 activities so as to (1) establish a good base for the research that will follow -- particularly, for propulsion systems for the IRLV and (2) smooth the concurrence cycle (D&F approval time) on procurements above $100,000. At the present time we know of no plan to withdraw '69 authority in this area.

In the Advanced Research Program and the Bio-technology Program we have been advised of plans for minor adjustments in the '69 authority which would amount to withdrawals this year and re-institution in the FY '70 authority. Because of past experience with this type planning, resulting in the Center losing more authority than it recovered, we are attempting to defend retention of current funds on a case-by-case basis. We will keep you informed of progress.

We are also working with the Purchasing Office, locally, on a case-by-case basis to try to make the remaining schedule as tight as possible. If this effort is successful, the carry-over will reduce to about $600,000, almost all of which will be in the propulsion program.

Experiment Definition for Manufacturing in Space - In conferences with Mr. Eldon Hall and Dr. Rodney Johnson on April 10, we secured tentative permission to initiate some of the more essential research in this area under sponsorship of the Supporting Development Program. We plan to recode the actions to the Experiment Definition program when funds become available. We are proceeding with this plan. If the Space Station PAD is signed as a result of the review with Dr. Paine Tuesday, much of the funding problem in this area will be alleviated.

NOTES 4/14/69 MOHLERE

B 4/15

UAH Budget: Phil Mason tells me that the Governor's package includes UAH as follows:

1969-70 - $2,191,033.00
1970-71 - 2,242,202.00
127,406.00 (conditional appropriation)
$4,560,641.00

Clyde Reeves retains hope that, in addition to the above, he'll receive $1,500,000.00 of conditional appropriation notwithstanding the Governor's somewhat lukewarm attitude shown at the March 5 meeting.

I am further informed that higher education appropriations as proposed by Governor Brewer represent a 16 1/2 per cent increase across the board. On top of this, UAH would receive $250,000 and the College of General Studies at Birmingham would benefit to the extent of $800,000 additional. Capital out lays are provided only for certain junior colleges.

The most stringent budget that Clyde Reeves feels he can accommodate and survive is:

1969-70 - $3,500,000.00
1970-71 - 2,000,000.00

Small College Computer Net: In contemplating the third generation computer at Alabama A&M, the thought occurs that this unit could become the nerve center of a small college network connected by remote stations. Athens College, Oakwood and possibly Florence State might be considered. Preliminary inquiries with IBM indicate that the idea is quite feasible and not unbearably expensive--about $600 per month should see the scheme through. Athens has already been approached and shows interest as does Alabama A&M. Of course, many details and, conceivably, some inertia need attention, but the proposal seems to merit the effort. It has some very interesting aspects apart from the economy angle.

I has indeed!
B

NOTES 4/14/69 MOORE

B 9/15

Metalization Problem with Diode Transistor Micrologic (DTul): At the request of Quality Laboratory, activity is being initiated by Astrionics in-house to analyze DTul 930, 932, 948, 962, 950, and 951 integrated circuit flat-packs with special emphasis placed on metalization. It is well known that the metalization has presented a severe problem in the past. The manufacturer claims to have rectified the deficiency. Considerable difficulty was experienced in removing the cap of the armaic flat-pack without damage to the device. Utilizing a diamond scribing pencil and a miniature lathe, we have been able to successfully open the flat-packs without damage to the device. These integrated circuit types are in limited use in AAP hardware. Results of this analysis will be provided at a later date.

ATM Solar Cell Module Solder Joint Failure Analysis: A recent phone call from Mr. Weaver, S&E-DIR, has indicated a misunderstanding of the purpose and scope of the ATM solar cell module solder joint failure analysis. Mr. Weaver indicated that Mr. Gorman had reflected concern to Mr. Weidner that the problem had been overly worked and that it appeared we had one contractor evaluating another with a third writing the report. The following points of explanation are offered:

a. There is approximately $2.5M worth of flight hardware involved, thus justifying a thorough analysis of the problem.

b. S&E-QUAL-A is set up to handle such analysis through their support contractor (Spaco). S&E-ASTR-EPN has no tech writer personnel except from the Sperry support. The hardware fabricator (Spectrolab) was working to a fixed price contract and it appeared that any deep analysis of the problem must be accomplished in-house (although considerable testing was performed by Spectrolab at their expense).

c. Much of the analytical work was reported on by S&E-ASTR-EPN to the Solar Working Group of the Inter-Agency Advanced Power Group in the March 18, 1969, meeting at NASA Headquarters (OART). Among the attendees were responsible solar power personnel from a number of the NASA centers, Air Force, and Navy. There was a general feeling of concurrence that solar cell solder joint problems (and cell interconnects in general) constitute a major concern and deserve appropriate analysis. Several of those present have requested copies of the failure analysis report from S&E-ASTR-EPN.

The offer was extended to Mr. Weaver that S&E-ASTR-EPN would be pleased to supply any additional information on this subject.

Giannini-Voltex: We are still experiencing difficulty in getting Giannini-Voltex up to speed in designing and producing a satisfactory 10 watt VHF transmitter for ATM. An MSFC design review/contract negotiation team spent last week at Giannini-Voltex defining the design and negotiating a production contract. We still have little confidence that they are on top of the technical aspects and we are significantly apart on dollar agreements. We are closely watching the situation and are investigating other sources of transmitters should such a step become necessary.

Bill,
Can I expect another letter from Gabriele Giannini?
B

NOTES 4/14/69 MURPHY

B 3/15

Safety Analysis Report:

Dr. Paine, Dr. Mueller, General Phillips, Mr. Helgeson and Mr. Lederer met on Monday, April 7, 1969, to decide on the type of safety analysis reports that would be submitted to Mr. Helgeson prior to each Apollo flight. Mr. Helgeson insisted that a written safety analysis report including an evaluation of all known risks be submitted to him for his use in briefing Dr. Paine prior to each flight. Mr. Lederer, with concurrence from Dr. Mueller and General Phillips, had resisted submission of such a report. The decision was made by Dr. Paine that MSF will submit a written risk evaluation safety analysis report. This decision will result in a substantial amount of work on the part of the Apollo Program Office to collect and summarize the information, and will create additional effort on the part of each Center. General Phillips has requested his people to compile the Apollo 10 Report without Center participation if at all possible. I am sure though that we can expect questions on Apollo 10 and certainly much more work on Apollo 11.

4/14/69 - NOTES - NEWBY

B 4/15

AWARDS:

Some 15 checks and letters were received from the Inventions and Contributions Board, representing awards based upon the publication of several NASA Tech Briefs of MSFC innovations. The checks and letters were referred to Leroy Aderholt of the Incentive Awards Office for distribution. ✓

R&D PROGRAM AUTHORITY - 1966:

As of January 31, 1969, FY 1966 program authority expired for obligational purposes. Headquarters requested during the week, a report for current unobligated balances with the intent of withdrawing such balances. Of the $1,561,000,000 received (peak year for MSFC R&D programs), only $183,000 was currently unobligated, this being primarily due to obligational adjustments associated with contract closeouts. ✓

GAO AUDITS - DEFECTIVE PRICING:

We have been informally notified that GAO/Atlanta is applying pressure to local GAO auditors to get out a discussion paper on their alleged defective pricing by NAR on the F-1 contract. → Dave V.

PRE-RETIREMENT SEMINAR: Head Investment Mgmt. ?

Approximately 140 employees attended one or more of the sessions of a Pre-retirement Seminar accompanied by 25 wives or husbands of employees. Most comments received from participants were favorable. ✓

HIRING AUTHORITY:

A teletype was received from Headquarters freezing all hiring of permanent employees in OMSF. Marshall's two commitments for PhD's will probably be affected by the freeze action. ✓

↳ "Subject to Dr. Paine's personal approval"

B

NOTES 4-14-69 SIEBEL B 4/15

1. ATM Cleanroom: I was informed by phone that, on 4-11-69, Dr. Paine had signed off for the construction funds for the ATM cleanroom. This cleanroom will be located within Building 4755. The cleanroom will have vertical laminar flow and meet the stringent environmental requirements for the integration of the experiments into the ATM. The cleanliness will be controlled to Level 100, the temperature to 70 ± 5°F, the relative humidity to 40 ± 5%. The size will be 40' x 28' by 35' high, sufficient for two work stations. Completion of the cleanroom is estimated for November 1969.

2. WACS (Workshop Attitude Control System): The brazing of tubing for the prototype panel has started. Braze joints inspected by X-ray show satisfactory results. The total facility is not yet complete, however, it is sufficient to perform this initial task.

3. Medical Experiments: Bob Schwinghamer made a presentation to our Laboratory personnel last week showing the work to which we are committed for the fabrication of these experiments. We will be working closely with him to integrate this workload into our plans. We are now getting into a position to get an appreciation of the total in-house AAP workload and will be discussing the implications with Mr. Kroeger within the next week or two.

4. Consolidation of all Manufacturing into ME: I have temporarily detailed to my staff Fred Weckwarth, Deputy Chief of our Manufacturing Division. His task is to study all the facets of the consolidation and in coordination with the old and new elements of ME to formulate operating methods for dealing with the workload, facilities, procedures, manpower, maintenance requirements, property accountability, warehousing, safety, funding, quality requirements, etc.

5. Retraining: In order to adjust our skill balance we continually train or retrain people. At present we are trying to meet our requirements for a metal finisher, a painter and an electronic equipment mechanic by retraining people from skills where greater numbers exist.

B 4/15

NOTES 4/14/69 SPEER

Baker-Nunn Pictures of AS-504: Reference Notes 3/24/69 Geissler. There has been speculation by Bellcomm that Baker-Nunn optical tracking film data indicated a possible S-IVB Stage "explosion" occurring between 12:05 and 12:41 Ground Elapsed Time (GET). Evidence presently available does not substantiate a stage breakup. First, the S-Band system signal was received up to 13:21 GET (expected system lifetime), and second, at the loss of telemetry signal at 12:17 GET (due to range) the stage was in a safe condition.

NOTES 3/24/69 GEISSLER

3/25/69

B 3/25

1. AS-504 Flight Results Review: Re: Your comments on NOTES 3/10/69 GEISSLER. You suggested a comprehensive review of all significant results from the AS-504 (Apollo 9) flight and their relevance to the Apollo 10 mission. On 3/17/69, you received a status report from Astronautics Laboratory on the analysis of the two major anomalies from the AS-504 Flight (S-II oscillations and S-IVB third burn). The next Flight Evaluation Working Group (FEWG) meeting is scheduled for Tuesday, 3/25/69, and we would hope to have more answers on the above mentioned problems and any others, at this time. Pending the results of this FEWG meeting, if you desire, we could have a briefing for you towards the end of next week. I have discussed this with Mr. James. However, two additional meetings have already been scheduled in the near future; one with Mr. Hage on 3/26/69 and a telecon with Dr. Mueller on 4/7/69.

2. Aerodynamic/Acoustic Problem on AAP-2 and AAP-4 Nose Compartments: In order to provide more clearance for the payload, the noses of AAP-2 and AAP-4 were changed sometime ago to a more squat double-cone configuration essentially as the one used on SA-203. A recent cooperative Air Force/MSFC wind tunnel program on this nose shape revealed more severe aerodynamic noise than expected. This raised the internal noise beyond the tolerance level of the payload. As a remedy, the payload compartment was filled with helium, whose low density reduces the noise transfer to the payload. That helped the noise problem, but introduced instead a large uncertainty in the compartment pressure and skin panel loads. We control the compartment pressure by vent hole sizing. Our correlations of vent hole discharge coefficients and of their dependence on the external flow are valid for like gases (air discharging into air), but are questionable for unlike gases (helium/air). Helium discharge tests are required to reduce this uncertainty. An exploratory test is about to start in our 14-inch tunnel; if needed, it will be followed by a more complete test series in early summer. Use of our own tunnel cuts both cost and time.

3. AS-504 Flight Evaluation: Several new problems have just come up relative to the AS-504 flight evaluation. One involves reports from the crew that they were subjected to negative g's during S-IC/S-II separation in a more severe way than was experienced by the Apollo 8 (AS-503) crew. Flight data indicates the separation sequence was close to nominal. The F-1 engine thrust decay was faster during the later portion of the decay period on AS-504 than AS-503 as it was expected to be. This may have more strongly excited a 5 Hz structural mode that was more pronounced on AS-504 than AS-503. A relatively strong longitudinal oscillation with negative peaks was also present in the command module on AS-501. We are theorizing now that the dynamics (-0.7 g's indicated in the command module on one peak) were the cause of the sensations of the crew. The other problem involves speculation from pictures of the S-IVB taken by Baker-Nunn cameras that the S-IVB "exploded" at about 13 hours and 20 minutes to 13 hours and 28 minutes into the mission. We have nothing more on this now but expect to have to work this problem also. I-MO is working to obtain additional Baker-Nunn film to assist in this investigation.

F

B 4/15

NOTES 4-14-69 Stuhlinger

1. OSSA SENIOR COUNCIL MEETING: A detailed Trip Report on this meeting (April 9) has been written and distributed to Directorates, Laboratories and Offices. If further copies are requested, please call 453-3033.

2. OSSA LAUNCH VEHICLE RELIABILITY: Vince Johnson, Deputy Associate Administrator for Engineering in OSSA, is now activating a working group to determine how OSSA can achieve higher reliability in their launch vehicles and avoid some of the failures of the past. In very general terms, OSSA wants to boost their success record. In the January OSSA Senior Council Meeting, MSFC was requested to name a member to this working group. S&E named Jack Trott, who is very well qualified to lend assistance to OSSA. I gave Jack Trott's name to Vince Johnson; he seemed very pleased to have such good support from MSFC.

3. ASTRONOMY MISSIONS BOARD: Dr. L. Goldberg, Chairman of the Astronomy Missions Board, is planning to hold the Board's May meeting at MSFC on May 23 and 24. This will give MSFC an opportunity of acquainting the Board with our capabilities, and it will give us an opportunity of learning about the Board's plans and recommendations regarding astronomy programs. More details about the meeting and about MSFC's contributions, will be reported as they develop.

April 21, 1969

SATURN V PROGRAM MANAGER

MEMORANDUM

TO:

Dr. von Braun, DIR

SUBJECT:

Stress Corrosion

Reference your question on Grau's notes of 4/21/69 (cy attached).

We do not believe it is feasible to remove all stress corrosion susceptible materials from Saturn V. For example, the 2014 aluminum used in the prime structure of the S-II and S-IVB stages is one of the most highly susceptible materials, yet it responds to careful treatment and controls, and no one recommends replacing it. I believe our present policy of removing all susceptible materials possible on 516 and subs without accepting undue technical risks or extensive requalification is a reasonable approach.

We plan to review the results of present efforts to remove stress corrosion materials from 516 and subs with S&E after our contractors complete their planning, and will inform you if agreement cannot be reached.

Lee B. James
June 11, 1969

1 Enc:
a/s

B 4/38

BALCH NOTES 4/21/69

S-II-7 - Stage was shipped to KSC on 4/15/69, as previously planned, with a total of 142 man-hours of transferred work.

S-II-8 - Stage is in the A-2 Test Stand undergoing post-static checkout. The stage contractor's work schedule is being revised to take into consideration the change of the on-dock KSC date to 6-30-69. Current plans call for utilizing the additional dwell time to eliminate any further overtime on this stage.

S-II-9 - Stage is in the A-1 Test Stand undergoing pre-static checkout and modifications. "Power-up" is scheduled for 4/22/69.

S-IC-10 - Stage was successfully static fired on 4/16/69 as previously planned. LOX loading was terminated early because of a leak in the MSE LOX fill-and-drain inter-connect flex hose. Sufficient LOX had been loaded to allow a firing for the planned duration, but to further assure this, the firing time was advanced almost 30 minutes. It was necessary to change out Engine No. 4 yaw activator very early on the day of the firing because of drift detected during routine checkout the night before.

BOMEX - All ships except the "Rockaway" have now completed sea trials. The "Rockaway" departed Gulfport for Barbados on 4/17/69 and was to have undergone sea trials en route. After Wednesday, 4/23/69, all ships will have departed Gulfport.

Legal Affairs - We have received five allegations of damage caused by the static firing of the S-IC-10 stage on 4/16/69. According to reports we have received, the effects of this firing were felt over an unusually wide area. Rather extensive noise and disturbance was reported as far away as Hammond, Louisiana, although no allegations of damage have been received from that area.

Public Affairs - Approximately 2,100 Boy Scouts of the Pine Burr Council held their Spring Jamboree on the old Gainesville site here at MTF on 4/18/69 through 4/20/69. During their stay, the Scouts and their leaders were given tours of the site, which included access to the test stands.

NOTES 4/21/69 BECKER

B 4/30

MISCELLANEOUS - Mr. Donlan presented, at the Earth Orbital Manned Space Flight (EOMSF) Panel Meeting (one of the PSG panels), material used by Dr. Mueller at the MSF Hideaway Meeting last weekend. The material was presented for background and described as Dr. Mueller's current thinking on the approach to future manned space flight. Mr. Donlan said it is now acceptable to talk about manned planetary in long-range future options. In this regard material used by Dr. Mueller at the Hideaway (prepared by Bellcomm) is an approach of looking for potential areas of system commonality across the spectrum of earth orbital, lunar, and planetary programs. The initial (and very cursory) work by Bellcomm includes consideration of launch vehicles, shuttles, in space propulsive stages, and lunar orbital and surface workshops. Chemical and nuclear stages were included. Dr. Mueller has Bellcomm currently working on this approach. I have been unable to determine his planned use of these data. Mr. Donlan asked that the panel consider a program alternative along the lines of this potential evolution of common, multi-use items. I have requested (as Chairman of the EOMSF Space Station Subpanel) that MSFC and MSC consider ways this approach may be attacked including methodology and data displays for future panel consideration. Mr. Donlan said the Bellcomm material was sensitive and did not desire to distribute it. I obtained a copy and can review it with you if you should desire. ✓

SPACE SHUTTLE - The Task Team has started official operation now that your letter of assignment has been received. Current membership consists of the following: Dr. W. A. Mrazek and A. J. Finzel, PM-DIR; O. C. Jean, S&E-AERO-DIR; J. Fikes, PM-S/AA; H. Kroh, S&E-ASTR-TS; J. Thompson, S&E-ASTN-PA; W. Corcoran, S&E-ASTN-A; C. M. Akridge, PD-SA-V. The following tasks are under way: (1) Definition of the spectrum of mission applications and capability to achieve the broadest market possible, (2) research into available literature, reports, papers, test results, etc., pertinent to the systems, (3) definition of critical and decisive technological areas, and (4) preparation of a plan for the next 12 months. ✓

SPACE STATION TASK TEAM - The team has been loosely collected together on the fifth floor of Building 4200 but still lacks a good candidate for the in-house design activity. Daily staff meetings will begin Wednesday morning. Our major effort revolves around establishing our interfaces with each other, other segments of PD, Science and Engineering, Central Systems Engineering, the labs, etc. ✓

NOTES 4/21/69 BELEW

B 4/30

WINDOW DESIGN STATUS: A current status of the MDA window design was given by S&E-ASTN on April 18. The current design of the glass, the frame, and the associated sealing materials was presented along with a discussion of Airlock, Lunar Module, and Apollo window designs. The present design uses a single pane of glass which is mounted in an aluminum frame and sealed with VITON A around the edges.

AIRLOCK CONTRACT NEGOTIATIONS: Negotiations on Contract NAS9-6555, Airlock Module and Systems Engineering and Integration, will begin at 9:00 a.m., April 21.

MEETING WITH S&E PROJECT ENGINEERS: A meeting with all S&E Engineers and AAP was held Friday, April 18. The meeting was informal and all current problems on the Airlock were statused. These meetings will be held every two weeks to keep all laboratories, Central Systems Engineering and AAP up-to-date on the status of the Airlock Module Project.

ASSIGNMENT OF S&E-QUAL REPRESENTATIVE TO GRUMMAN: Mr. Tom O'Donnell will be located at Grumman as of April 28. He was previously assigned as one of two S&E-QUAL representatives at North American Rockwell/Tulsa facility. At the present time, the MSFC/MSC Agreement for Reliability and Quality Assurance Functions at Grumman is in the final stages of coordination. It is expected that final agreement will be reached by April 28. This agreement details the extent to which we will utilize the MSFC Apollo Resident Office in accomplishing our Q&RA functions.

ATM DIGITAL COMPUTER STATUS MEETING: An ATM Digital Computer Status Meeting was recently held at IBM. The program is moving satisfactorily with only minor problems being incurred. The revised IBM Q&R Plan containing the MSFC comments is scheduled to be released April 22, with all parts lists and specifications (except 2) having been submitted to MSFC. The Critical Design Review is scheduled for May 9.

ATM FUNDS: The S&E Directorate has initiated actions using all their FY68/69 program authority against the ATM system. It may be necessary to reallocate ATM funds for the remainder of the year. S&E will furnish a tabulation of those items yet to be covered this fiscal year which are mandatory for procurement initiations.

NOTES 4-21-69 BROWN

B 4/30

J-2 ENGINE - Based on results from the third burn experiment on AS-504, the J-2 engine flight mission rules have been established for AS-505 covering the contingent actions for various failure modes. For the AS-505 flight, the following has been established:

a. Failure of LOX chilldown system - command an eight second LOX lead through the engine main valve followed by a 100 second delay before engine start command. The delay permits most of the LOX to escape from the engine.

b. Failure of LH_2 chilldown system - command a normal eight second fuel lead to chill the system, instead of the 53 second lead planned for earlier vehicles. An 11 to 12 second lead was desired for proper chill; however, software and hardware changes would be required which cannot be justified. The eight second lead provides a good probability of success and all resulting failure modes are benign.

c. Failure of main LOX valve to close after first S-IVB burn - abort the mission. A LOX rich shutdown will damage thrust chamber, tubes, making fuel pump stall during re-start possible and excessive performance degradation probable.

d. Failure of main fuel valve to close after first S-IVB burn - inhibit engine fuel system chilldown and command engine start. An 18.6 second fuel lead will result instead of the normal eight second lead.

e. Flight experiment - the LOX and LH_2 chilldown system failures will be simulated after SC separation to obtain data to confirm the rules for all future flights. The LH_2 rule will be modified to permit fuel bleed through the engine for 53 seconds instead of only the 8 seconds specified by the rule to obtain as much chilldown data as possible and to compare with AS-504 results. No attempt will be made to achieve ignition during this experiment.

J-2S Testing at AEDC - Two 75 second idle mode tests were conducted on 4/17 utilizing the tenth row idle mode injector. Preliminary indications are that heat input to the fuel is approximately four times that of the previous injector. However, there was excessive steam blowback from the facility the effect of which has not be evaluated. Chamber pressure oscillations of 2-1/2 - 3 psi and 7 - 8 psi at approximately $1H_z$ were experienced on tests A & B, respectively. Frequency approximately 1 hertz. There was no hardware damage. Analysis of the data is proceeding. No indication yet as to what to do for next air-on. AEDC is preparing for test next Thursday.

CONSTAN NOTES 4/21/69

B 4/30

Negative.

NOTES 4-21-69 Downey

B 4/30

Most of our activity this week was concerned with preparing first iteration input for various PSG panels and sub-panels. Nothing significant to report.

NOTES 4/21/69 FOSTER

B 4/30

SENATE FY-70 BUDGET HEARINGS - NASA Authorization Hearings of the Aeronautical and Space Sciences Committee (Chairman Anderson, Dem., New Mexico) will be held during the period April 23 through May 8. There is currently no indication that you will be required to attend. Dr. Paine will testify on April 23 and Dr. Mueller on the 24th. Testimony by other NASA Program Offices, ESSA, and Department of Agriculture is scheduled the week of the 28th. The Hearings conclude with testimony by Milton Klein, AEC, DOD, and Dr. DuBridge. We plan to have Mr. Tockley of this office attend the Hearings on April 23 and 24.

UNIVAC 1108 CONTRACT - Two call meetings of the ADP Management Decision Group were held this week to consider MSFC's position on acceptance of the UNIVAC 1108 system. Acceptance testing had previously been scheduled for April 14, but software deficiencies still exist in the system. The system is essentially operational and Computation Laboratory has need for additional time on the EXEC VIII system. The Group agreed to start the acceptance testing of a deficient system. In consideration for these deficiencies, UNIVAC will provide MSFC with time currently being purchased at the University of Alabama at half the normal cost and will reduce rental on the 1108 system until the deficiencies are corrected. Under this arrangement, MSFC and UNIVAC have agreed for acceptance testing to begin on April 19 thereby increasing the possibility for 3-G time by 50-80%.

SUBMISSION OF A RESEARCH AND PROGRAM MANAGEMENT PROGRAM OPERATING PLAN - Headquarters has requested that we submit a Research and Program Management POP (Designator 69-2) on June 15, 1969.

This plan will reflect the latest available data for FY 1969 and a phased monthly plan for FY 1970 based on guidelines provided. Guidelines to MSF centers for FY 1970 will be based on the $304,000,000 recommended by the Manned Space Flight Subcommittee which was $3,450,000 less than requested. Indications are MSFC will be assessed $1,400,000 (approximately 40%) of the cut leaving a planning level of $110,101,000.

NOTES 4/21/69 GEISSLER

B 4/30

1. Mars Viking Program: A fast response anemometer, being developed under the technical supervision of our Aerospace Environment Division, has aroused the interests of several Langley Research Center engineers. They are considering the possible applicability of the anemometer to the Mars Viking Program (landing of instruments on Mars). The Langley people plan to visit the developing contractor, Basic Devices, Inc., to witness a demonstration test of the instrument. It is not anticipated that we will be involved in the application of the anemometer to the Mars Viking Program, since it is an LRC project.

2. Earth Resources Program Photo Science Screening Meeting: Mr. O.H. Vaughn and Mr. S. Brown were invited to attend the Earth Resources Program Photo Science Screening Meeting in early April at MSC. This informal group, established by MSC's Earth Resources Division, is responsible for reviewing all of the earth-looking photography taken during the Apollo 9 mission, and will prepare a "quick look" science report in the near future.

3. Earth Survey Instrumentation Timeline Studies: North American Aviation (NAA) is conducting studies for NASA about satellite instrumentation to be used in earth resources surveys. In these surveys, one of the critical parameters is cloud cover. At NAA's request, we furnished them the computer-simulation program which we developed for statistically describing worldwide cloud cover, for use in satellite instrumentation timeline studies. NAA informed us that they were very pleased with the results of the application of our program to their studies. After a requested briefing, GSFC indicated that they plan to make further use of it in-house. Our efforts during FY '69 to obtain funding for a continuation of this work, were unproductive. We hope to obtain support during FY '70, since the results will be valuable in the satellite instrumentation time-line analysis area, including Marshall's own AAP work.

4. AAP Post Pass Data Handling Plan: Mr. Neshyba of MSC presented an AAP Data Handling Plan to OMSF (Mr. William C. Schneider and General John D. Stevenson) on April 15, 1969. Personnel from MSC, GSFC, KSC and MSFC attended. The MSFC spokesman was Mr. E. B. Nathan, Co-Chairman of the Mission Evaluation Panel. Salient features of the MSC Plan are data point redundancy removal at MSFN remote sites and digital transmission of the resulting data stream to GSFC and subsequently to MSC and MSFC to assure timely and cost-effective data availability for mission evaluation. Mr. Schneider accepted the MSC concept for data handling, and he agrees that GSFC should study the feasibility of implementing this scheme. An action was placed on MSFC to follow the GSFC study and prepare the pros and cons as to the effect on MSFC, if the concept were established for the AAP. The GSFC study is to be completed by May 23, 1969. General Stevenson emphatically stated that NASA has to find better and cheaper ways to handle flight data, and that this MSC concept should be considered.

NOTES 4-21-69 GOERNER

B 4/30

SPACE STATION - SOLAR PANELS: Representatives of JPL met with us and representatives of Science and Engineering on 4-15-69 to discuss solar panel/stabilization interaction in a Space Station. NASA Headquarters had directed JPL to consider the applicability of their lightweight planetary solar panel technology to the Space Station program, and JPL requested this meeting to obtain data on our Space Station configuration. The specific areas of interest were mathematical models of the structure and the control system. Since our 1975 Space Station is in the early definition phase, these data were not available; however, data are available for the cluster. Personnel from S&E-ASTR presented detailed data on the cluster which satisfied the JPL requirements. ✓

NOTES 4-21-69 GRAU

B 4/30

1. COST REDUCTION EFFORT: We have been participating as a permanent member on the Saturn Follow-on Production Cost Reduction Working Group and are eager to make a significant contribution. In accomplishing this cost reduction, not only on the Saturn but on all programs, we want to make sure that the quality and reliability of the end-item is maintained. We would also like to prevent that the contractor is relieved of his responsibility to furnish flightworthy hardware, which could happen if Marshall furnishes guidelines which are not supported by past history.

I discussed the subject with Colonel Teir, who is in charge of this effort on the Saturn V for Colonel James, and who also wants to work toward the cost reduction goal without sacrificing the reliability of the end product. We have to keep in mind that the requirements placed in our contracts did not happen by accident, and the success experienced so far did not either. I would like to strongly recommend that we adopt the policy that before any prior activities are reduced or eliminated, one must show data or rationale why it will not be detrimental to the reliability of the end-item.

Our quality and reliability program consists of a complex model developed over the years, and we cannot with mathematical certainty define what ingredient can be eliminated without serious effects. However, we are reasonably sure that the model works. For future programs and follow-ons, we should not have to re-justify every ingredient in this model which led to success, but rather we should justify the removal of specific ingredients.

2. S-IC STRESS CORROSION FAILURE: With reference to your question about putting up a fight to have S-IC stress corrosion policies changed (reference NOTES 3-24-69 HEIMBURG): We have reviewed this problem with Astronautics Laboratory and find it difficult not to suggest complete removal and replacement of the stress corrosion parts as soon as possible. However, from the viewpoint of time and cost, I realize the difficult situation created by this solution. I, therefore, recommend that the stress corrosion susceptible materials be completely and unconditionally replaced on any follow-on program, and that in the present program up to and including vehicle AS-515 stress corrosion susceptible material be replaced by other material wherever possible without an undue amount of cost and effort. This position deviates from the one taken by the Saturn Program Manager in his memo PM-SAT-MGR-12-69 of March 24, 1969, to Mr. Heimburg. Our approach would result in AS-516 and subs being free from stress corrosion susceptible material. In the approach taken by PM-SAT-MGR, this would not be the case. I do not believe that MSFC should burden itself with an uncontrollable risk into the far future while the technical solution is available.

Lee James
What's your comment?
B

NOTES HAEUSSERMANN 4/21/69

B 4/30

Servoactuators for S-IC-7: It had been planned to retrofit S-IC-7 with ECP 0427 type actuators. This actuator design eliminated materials susceptible to stress corrosion and/or hydrogen embrittlement and added a 3° discrete sensing device. The new actuator design is not presently qualified and cannot be delivered to KSC prior to start of stage checkout. Considering all facts, CSE has agreed with PM to delay the retrofit until S-IC-8 where installation can be made prior to KSC shipment. S-IC-7 will use the same type actuator used on S-IC-3 through S-IC-6.

NOTES 4/21/69 HEIMBURG

B 4/30

1. S-II ANOMALY INVESTIGATION: (a) A test program to evaluate the resonant frequency of the S-II outboard lox duct has been completed. Preliminary data evaluation indicates the frequency is from 18 to 22 Hz with higher values occurring at high pump inlet pressure and low engine mixture ratios. The facility will now be changed to test the inboard configuration with helium purge tank at pump inlet (proposed new flight configuration). Testing will resume 4-22-69. (b) In an effort to coordinate and consolidate the activities of all principle investigators of the S-II oscillation anomaly, a meeting was held on Wednesday, April 16. Representatives of Boeing, ASTN, ASTR, AERO, and CSE were present. It was agreed that a weekly meeting would be held for reporting the status of the analytical and test activities of each participant, exchanging ideas, identifying problem areas and initiating resolution. (c) An analog analysis of the S-II oscillation, recently completed by The Boeing Company, has successfully duplicated AS-504 flight results. Considerable "arbitrary adjustment" of parameters was required to accomplish this, however. The study conducted has been useful to (1) Gain understanding of the relative sensitivity of parameters contributing to the oscillation. (2) Reduce uncertainty of tolerance bands on each parameter. (3) Gain gross understanding of the limit cycle mechanism. (4) Aid in the construction of requirements for a refined digital model capable of predicting stability margins for past and future Saturn V flights.

2. S-II-508 INSULATION DEBONDING: Although the first assessment of the S-II-508 insulation subsequent to static firing indicated no problems, it now appears that we do have some difficulties with the corked areas. There is definitely some debonding of the cork and a few cracks in the foam insulation under the cork in the ramp area near the recirculation lines. The preliminary findings indicate that the problem is caused by improper processes and procedures during the application of bonding both the foam/core to aluminum skin and cork to foam.

3. S-II-13: Cylinder 1 of S-II-13 was accidently trimmed approximately .200 inch too short at the J-weld attach point. Since the J-weld land is already trimmed, the under tolerance condition cannot be corrected at that point. However, the aft lox bulkhead girth weld can be made .200 inch lower. This will allow all feedlines to be brought back into tolerance. No other systems appear to be affected, but the investigation is not complete at this time.

4. S-IC-505 FLUID POWER BRACKET FAILURE: As a result of cracked brackets found on S-IC-9, 10, and 11, (reported in our notes of 3-24-69) a discrepancy check was run on S-IC-5 and both brackets were found to be cracked. The brackets are made of stress corrosion susceptible material and the brackets' flat surface was bolted to a curved surface placing the bracket under sustained stress. The brackets were replaced and shimmed to relieve stress. For other stages, brackets are being made from non-stress corrosion susceptible materials.

NOTES 4/21/69 HELLER

B 4/30

1. Package of Film to be Flown on Apollo 10:

Drs. Dozier and deLoach recently initiated (as part of SSL's radiation analysis for the ATM and OWS) an experiment to measure effects of proton irradiation on 12 different kinds of film for the CM (command module) of the 505 flight. Design was begun on April 1 and the completed package was handcarried to KSC on April 7. Help was received from many people at MSFC, otherwise it would not have been possible to meet this nearly impossible deadline.

2. Proton Spectrometer:

I am glad we could present to you, in connection with Dr. Guenther's NAS termination discussion, the status and background of the Proton Spectrometer experiment which is planned as a housekeeping or Saturn engineering measurement. We hope that it does not mean farewell to Dr. Guenther, but that he can continue with us on the experiment as a member of the University of Alabama. Your help with PM (Program Management) to obtain the funding for a possible University contract is greatly appreciated. As Dr. Guenther explained in our meeting, the experiment will measure the hard tail end of the proton spectrum. The results are urgently needed for solution of the film fogging problem for ATM and for longtime occupancy of the OWS (Orbital Workshop).

3. T-031 Flight Experiment Status:

T-031 is an OART approved SSL flight experiment to fly retrievable coupons on the S-IV/B Workshop. These coupons contain several thermal control coupons which are exposed to the space environment. At the end of the mission, in-space measurements of a few of these samples will be made and one of the coupons will be retrieved for ground evaluation. Other coupons with the same samples will be left on the workshop for retrieval on subsequent revisits.

The in-space measuring instrument is an integrating sphere reflectometer, the prototypes of which are in the final checkout stages at Block Engineering, Boston, Mass. These instruments will be brought to MSFC and evaluated both electronically and optically.

The experiment has not been approved by the MSFEB; however, a similar experiment proposed by Carl Boebel of the Air Force has been approved. The Air Force experiment is essentially the same as T-031 except they are not planning any in-space measurements. Mr. Boebel indicated he would be in favor of a joint AF/NASA experiment using our reflectometer. We are going to follow this up with OART and the OMSF/AAP Office. Dr. Sieber and his Scientific Engineering Division will work on this jointly with members of our Space Thermophysics Division.

NOTES 4/21/69 HOELZER

B 4/30

1. ACCEPTANCE TESTING OF THIRD GENERATION COMPUTER SYSTEM:

A 30-day period of acceptance testing on the Third Generation UNIVAC 1108 Computer began at 8 a.m., April 19, 1969. Specification compliance tests were performed on April 17 and the contractor was found to be deficient in several items of system software. These missing items will not prevent overall systems acceptance testing from proceeding. Contracting has negotiated reductions in rental cost to be in effect until the deficiencies are cleared up.

Computation Laboratory expects UNIVAC to pass this performance test in a reasonable period of time.

2. EVALUATION OF THE 18 HERTZ LONGITUDINAL OSCILLATION OF THE S-II STAGE:

During the period from April 4 to April 14, the Vibration Section supported Phase I of the subject Oscillatory problem. Phase I was concerned with the determination of the axisymmetric modes of the aft LOX bulkhead as a function of propellant levels which correspond to those existing just prior to and through the period of longitudinal oscillation observed during the flight of AS-503 and AS-504. To support Phase I, considerable compensatory time and contractor overtime was required in addition to 206 hours of IBM 7094 time. Approximately 88 hours of this time was run at the Slidell facility.

3. RELEASE OF B-5500 TO GSA: Computation Laboratory's B-5500 computer was released to GSA March 31, 1969. Negotiations were made to acquire a limited amount of B-5500 machine time from the Navy Department at Panama City, Florida.

4. RAYTHEON 520-EAI 231-RV: The Raytheon 520-EAI 231-RV hybrid computer system from Slidell has been installed in Building 4487 (Astrionics Laboratory). The hardware has been checked out and the software is currently undergoing final checkout. Productive use is expected to begin May 1, 1969. The purpose of this hybrid system is to support the Astrionics Laboratory in checking flight hardware for the Orbital Workshop.

NOTES - HUBER - 4/18/69

B 4/30

1. NUCLEAR SYSTEMS AND APPLICATIONS STUDIES: Proposals have been received for studies of "Nuclear Flight System Definition, Potential Flight Test and Early Operational Payloads". These studies will define nuclear stages employing the NERVA engine, define a stage development program, and examine potential early mission applications, such as outer planet missions and Mars surface sample return missions. ✓

It is planned that two study contracts will be awarded, totalling $1.2M (joint OART and OSSA funding). Evaluation of study proposals will begin 4-21-69; award of contracts is expected in about six weeks. ✓

2. PLANNING STEERING GROUP (PSG) ACTIVITIES: The pace of activities has increased as expected, in order to meet the new dates for submittal of NASA material to the President's Space Task Group (expected by mid-June, 69). Several MSFC representatives participated in meetings of the "Earth Orbit Manned Space Flight" (Donlan) Panel in Washington during the past week. A sub-panel has been formed within the "Lunar Exploration" (Scherer) Panel, to formulate lunar program alternatives. This sub-panel met in Houston during the past week, to select a limited number of program alternatives for further definition. Data on several candidate planetary missions have been submitted by MSFC to the "Planetary Exploration" (Hearth) Panel; additional data are being prepared on Saturn V and Saturn V/NERVA outer planet missions. Completed descriptions of program alternatives are due from each Panel to the PSG by 5-1-69. The PSG will then synthesize these into total program options by 6-1-69. The Centers' role in this synthesis effort has not been defined to date. ✓

NOTES 4/21/69 JAMES

B 9/30

1. Apollo 10 Flight Readiness Review (FRR): At the Apollo 10 FRR scheduled for Wednesday, April 23, at KSC, I plan to condense the items presented at your Preflight Review to four items: Dynamic transient during S-IC/S-II staging of AS-504 flight; Low S-IC stage performance during AS-504 flight; S-II oscillations; and S-IVB mission rule changes associated with the temperature data to be obtained by simulating the S-IVB fuel and LOX lead after spacecraft separation and prior to the dump sequence. The major portion of my presentation will be on S-II oscillations, and I have assured that the proper backup personnel from S&E and North American will be present.

2. AS-505 Operations at KSC: Checkout of the AS-505 Launch Vehicle at KSC is progressing smoothly. There will be limited launch vehicle activity through Thursday, April 24, due to space vehicle hypergol loading activities. The wet CDDT is still scheduled to start on April 27 with T-0 scheduled to occur May 2. The dry CDDT will be run on May 3.

3. AS-506 Operations at KSC: Launch vehicle systems testing has been essentially completed. The spacecraft and LM have been erected in the VAB and the first overall space vehicle test (OAT #1) is scheduled for May 6.

4. Launch Vehicle Ground Support Equipment Contract Consolidation: We met with Dr. Rees and Mr. Gorman during the past week concerning the proposed LVGSE contract consolidation. Both agreed with our approach of recommending a total LVGSE competitive bid which will include the effort presently performed by GE, RCA, Sanders, and others. The draft of the procurement plan for the consolidation is in preparation. We plan to work in parallel with all of the MSFC people involved in approval of this plan by providing copies of the package to each individual and holding a final input meeting on April 30, 1969. Our target date for dispatching the procurement plan to Headquarters is May 5, 1969, with planned implementation in June 1970.

5. Modularized Flight Program: Reference my 4/14/69 notes concerning our plans to implement a "modular assembly" concept in the AS-507 LVDC flight software. A presentation of this modularized flight program is tentatively scheduled to occur during the week of May 5. Gordon Heffron (Bellcomm, Headquarters) has taken the action to establish a specific time for this 30 to 60 minute briefing to be given to Dr. Mueller and General Phillips. A dry run will be scheduled about one week prior to the MSF briefing and a briefing to KSC will be held prior to the MSF briefing. A version of the modularized flight program equivalent to the preliminary AS-506 flight program will be exercised through the SDF (breadboard) prior to the MSF and KSC briefings to obtain practical experience in the checkout operation. This operation is expected to be identical to the conventional AS-506 flight program checkout.

6. S-IC-10 Static Firing: Static firing of the S-IC-10 stage was successfully accomplished on April 16 as scheduled.

NOTES JOHNSON 4/21/69

B 4/30

OBLIGATION OF FY-69 OART PROGRAM. A meeting was held on Wednesday, April 16, to investigate ways to expedite finalization of FY-69 OART procurements. The meeting was attended by representatives from A&TS-FIN, A&TS-PR, in addition to several members of the Research Planning Office. Present status of this year's OART Program was presented and compared with prior years' experience. Everyone agreed that concerted effort would be required and devoted to finalizing all OART actions prior to June 30th. Several suggestions for improvement in Procurement Request processing were offered. A general agreement was reached regarding adoption of specific methods to expedite paper flow and communications among the several staff offices involved. Mr. Russell of this office and Mr. Lawrence Garrison, Purchasing Office, were designated key contacts for all matters pertaining to SRT procurements. Several problems have been resolved since the meeting and we are confident that we will close out the year with a good obligation status.

INTEGRATION OF EXPERIMENTS TO27/SO73/S149. Permission was received two weeks ago to proceed with the combination of TO27, Contamination Measurement and SO73, Gegenschein/Zodiacal Light, as well as making provision for the use of the TO27 extension mechanism for S149, Meteoroid Measurement. When the scope of work for the modification of the TO27 hardware contract was drafted, it was found that the original TO27 Determination and Findings, were too restrictive to allow this addition to be made. The D&F has therefore been modified and Mr. Wilbur Davis handcarried it to Headquarters Sunday. We have received promises of quick action and any help necessary from several persons in Headquarters. This is the latest of several short delays which will force the TO27/SO73 flight unit delivery to be a couple of months later than the AAP office would like. This problem does not appear to be too serious. If for some reason the D&F does not get signed promptly, then we will be in a difficult situation and may have to drop SO73 to save TO27.

NOTES 4/21/69 MOHLERE

B 4/30

No submission this week.

NOTES 4/21/69 MOORE

B 4/30

1. GSFC ATM Experiment: Vibration testing of the qualification test unit of the GSFC X-Ray telescope was performed in the most severe axis. The only damage observed was to an electronic package that was not flight type hardware. The average change in focal length was 150 micro inches, which is most satisfactory. ✓

2. ATM Solar Array Deployment: Dynamic analysis of the ATM solar array indicates structural deflections during deployment will be minimal. This is contrary to the results observed in the deployment of the Pegasus detector panel wings where a large accordion motion was observed in both ground testing and flight. The difference is due to a lower natural frequency, effectively detuning the motion, and a geometric change in the deployment mechanism. ✓

3. ATM Charger Battery Regulator Modules (CBRM): As a weight saving effort, we are conducting a weight, cost, stress, and schedule study of aluminum versus magnesium and castings versus machined housings for the ATM CBRM design. Since there are 18 of these items on ATM, the weight payoff could be attractive. ✓

4. Power Sources: An advanced integrated circuit 75 Volt-Ampere Static Inverter developed by Texas Instruments on Contract NAS8-11925 has successfully undergone sled testing with the new strap-down platform at Holloman Test Range. This inverter represents a maximum of integration for a power supply which should result in greater reliability for the system. Also, of secondary importance, is a reduction of size and weight. ✓

5. Giannini-Voltex: We have been advised by the Purchasing Office that they will not insist we continue with the contract with Giannini-Voltex for VHF Transmitters for ATM. In addition to our complete lack of confidence that Giannini-Voltex has the technical capacity to do the job, Purchasing feels that the company is in dire financial condition as well. We have been advised therefore to establish another source, and we are proceeding to investigate in detail the feasibility of modifying the planned, but not yet procured, transmitter to be used by McDonnell-Douglas in the Airlock. This unit is built by Conic in San Diego, a reputable outfit in our opinion. It may be that Dr. Giannini will be pleased with the above arrangement if his costs are reimbursed; however, you will very likely hear from him. Mr. Kroeger is aware of our approach and concurs. ✓

NOTES 4/21/69 MURPHY

B 4/30

Negative Report

NOTES - 4/21/69 - NEWBY

TECHNOLOGY UTILIZATION:

Four Technology Utilization proposals contained in our recent "shopping list" submittal to Headquarters have been approved along with a fifth one which was submitted previously. These projects are as follows:

1. Biological Demonstration of Ultrasonic Scanning Device - $10,000 - Quality Reliability and Assurance Laboratory
2. Identification and Special Evaluation of New Technology - $40,000 - University of Alabama Research Institute
3. Sight Switch Demonstration Units - $1,000 - Hayes International
4. A Technology Survey on Adhesives - $25,000 - ME Laboratory and Hayes International
5. A Technology Survey on Aprotic Organic Electrolytes - $44,000 - NAR/Rocketdyne

Total Funds: $120,000

COMMUNITY ACTIVITIES:

At a meeting of the Chamber of Commerce Board of Directors on April 11, 1969, it was reported that the Alabama Space Science Exhibit is 40% complete and that the official opening is scheduled for September. It was also announced that Jimmy Walker, Jimmy Record, and T. B. Chesnutt are hoping to meet with Dr. Paine on April 28, 1969. Jimmy Walker will be working through Senator Sparkman's office in setting up this meeting.

VISITS TO APOLLO 10:

A letter to all employees announcing the MARS-sponsored trip to the Apollo 10 launch next month was distributed last week. Interested employees are being asked to complete the form attached to the letter and submit it to MARS.

GAO ACTIVITY:

We have been advised by Frank Dill, PM-CO, that the GAO on the West Coast had requested Mod. 800 (and the negotiations summary) to the Douglas S-IVB contract. Mod. 800 is for the incentive conversion. We in turn notified OMSF, who agreed that we could not withhold the records but should not supply answers to any questions. All questions and answers relating to incentive conversions are to be staffed through OMSF prior to release to GAO.

GULF STREAM DRIFT MISSION:

A camera system for crew surveillance has been assembled and prepared for installation aboard the Ben Franklin, which is the submersible boat that is being used for the Gulf Stream Drift Mission scheduled for June 1969. The camera system consists of 3 cameras and controls which provide selective sampling rates. The system will provide continuous surveillance for the proposed 30-day mission.

NOTES 4-21-69 SIEBEL

B 4/30

1. Neutral Buoyancy Testing: An underwater color motion picture was made of the ATM film retrieval techniques which are being developed and tested in the neutral buoyancy simulator. This film was requested by Astronautics Lab for showing to the NASA-EVA Working Group. Duplicate TV tapes of the recent astronaut tests involving ATM hardware evaluation were made at the request of Mr. Jack Joerns of MSC and forwarded to Houston.

2. Orbital Workshop Attitude Control System (WACS): The valve panel for the breadboard unit is in the final stage of completion. It represents the first all-brazed assembly performed in our shops. Inspection results are very good. A completely new design of the thermal unit is being prepared by ASTN. The original idea to utilize the breadboard has been abandoned.

3. Cost Reduction Program: The Laboratory had achieved 252.7% of the annual goal by March 29, 1969, with still some submissions awaiting evaluation.

4. Cryogenic Tanks for AAP-CSM: In response to a request from the MSC/AAP Office, one of our engineers returned to Bendix Corp., Davenport, Iowa, on April 8-10 to support the MSC team's review of the cryogenic tank program required on the AAP service module. The mission of the MSC team is to identify and implement the changes and improvements in software, tooling, quality, testing, and management necessary to convert from R&D quality products to flight quality hardware. After identification of the problem areas, a contract will be negotiated between MSC and NR converting the tank procurement from GFE to CFE.

5. Tulsa: Mr. E. Bryan, our Resident Engineer at NR/Tulsa (S-II and CSM programs) is being reassigned to ME at MSFC as Chief, Tool Design Branch. Eddie Bryan had also acted as MSC's (Bill Gray's) representative at Tulsa. MSC's representation will be handled by DCAS and at a "hand-over" meeting last week, it was established that any manufacturing problems which arise between the present time and the end of the contract will be handled on a TDY basis from either Seal Beach or the ME Laboratory. I was happy to hear that Mr. Harry Todd, President, Tulsa Division/NR, expressed his appreciation for the excellent job that Mr. Bryan has done. Appreciation was also expressed by Colonel Payne, the Resident AF Representative, and by Bill Gray of MSC from whom I have also received a letter to this effect.

6. ATM:

a. During January 1969, the Prototype Branch of ASTR (Mr. Angele) accepted the responsibility to handle over 140,000 manhours of electrical and mechanical manufacturing for work directly related to mainstream ATM, for example Charger Battery Regulator Modules (CBRM's), invertors, power supplies and distributors. We are reviewing the shop capacity and documentation status. We will then arrive at suitable make/buy decisions and establish realistic schedules for discussions with Mr. Kroeger.

b. Owing to thermal requirements, the ATM Sun End Canister design calls for extensive use of components made from laminated glass fabric. We are buying some structural components currently and it is expected that we will have to purchase aperture cover and access door components shortly. Our Industrial Support Branch is attempting to find the lowest cost way of getting these components. None of our local suppliers have an autoclave. We know that many of the large aerospace firms have autoclaves but their manhour rates would also be high. We have performed a study and have a listing of smaller type companies in the Fiberglass business with autoclaves. Some of these companies will be surveyed beginning next week to ascertain that they can produce hardware to meet flight standards.

NOTES 4/21/69 SPEER

1. AS-505 Flight Mission Rules Review: The AS-505 Flight Mission Rules Review was held by telecon on April 16 with the Mission Director, George Hage, and the Flight Director, Glenn Lunney. There were no significant launch vehicle problems raised in the meeting. Our restart GO-NO GO criteria have been accepted in principle by Hage and more detailed briefings of Hage and Lunney on the S-IVB restart rules related to chilldown system failures (AS-504 third burn experience) are being conducted separately.

2. AS-505 Range Safety: We understand Dr. Debus is concerned about the increased risk to the VAB area in the dual event of engine 3 or 4 out early in S-IC flight followed by range safety destruct. This increase in the risk over previous flights, as pointed out in the Preflight Review, results from the flight geometry on southern azimuths from Pad B. Consideration is being given to restricting the flight azimuth limit to 100 degrees and thereby shortening the launch window 26 minutes; but no decision is expected prior to the Flight Readiness Review.

3. Reduction in Operations Support: Current operations budget cuts and constraints have necessitated a review by OMSF of mobile support and other requirements on DOD for FY 1970 and 1971. The Apollo ships and Apollo Range Instrumentation Aircraft (ARIA) are key targets for reduction after the first lunar landing. This is due to excessive costs of the mobile fleet (ships, $5 M per year; ARIA, $.75 M per year; ground site average, $1.5 M per year) as incurred by NASA. Although the mobile fleet is a joint usage item, NASA pays 85% and DOD 15% of the operations cost. The OTDA has initiated efforts for renegotiating a more reasonable cost sharing agreement with certain of the mobile fleet remaining in a "first priority Apollo" class and other shifted into routine DOD management and operation. The reentry ship, Huntsville, and up to 4 of the 8 ARIA will probably fall into the latter category. This is compatible with MSFC mobile support needs which are identifiable at this time. However, since the mobile fleet constitutes a very critical element of the MSFN for retrieving data for engineering and malfunction analysis, we will continue to strongly support the retention of an adequate mobile fleet, in particular the ARIA. The ultimate needs for mobile support depend critically on the launch window required. A significant reduction in support could be achieved by agreeing on a fixed azimuth launch (on time).

NOTES 4-21-69 Stuhlinger

B 9/30

1. ASTRONOMY MISSIONS BOARD: Highlights of the Board meeting on April 18 included a two-hour participation by Dr. Paine (the manned program had to be supported in the 1970 budget, but science will be strongly supported in the next budget); presentations by Mitchell and Halpern on the Heavy Explorer Program (Phase C funding will begin in FY 71; at present, MSFC and GSFC are jointly studying project plans); and attendance by Chuck Mathews (we must come to grips with the role of man in astronomy, and we must establish a much closer contact between space station planners and science program planners). A more detailed trip report is available through telephone 3-3033.

2. PSG ACTIVITIES: The Astronomy Working Panel of the PSG (under Jesse Mitchell) will meet on April 24; I was asked to give a presentation on existing and planned high-energy astronomy projects (SAS, X-ray satellites, Heavy Explorer satellites).

3. OAO-II: After four months in orbit, the Wisconsin Experiment (A. Code) is 85% functioning; the Smithsonian Experiment (F. Whipple) is 50% functioning. Results have far exceeded expectations regarding quantity, quality, and content. Statements by the PI's: F. Whipple - "Perhaps the greatest benefit of the OAO-II is its demonstration that astronomers can make valuable observations from space. We can send highly complex and extremely delicate instruments into the space environment and operate them from the ground. The potential for this type of capability is, of course, enormous." A. Code -"The full impact of the OAO-II data will not be felt for at least a couple of years. Some theories on cosmology will have to be modified and others discarded. Practically all phases of optical astronomy will be affected as a result of OAO-II."

April 28, 1969

NOTES

2512

TO: Dr. W. von Braun, DIR May 15, 1969

Thank you for your good words about the OTES Workshop meeting.

An "action plan" was not generated at this workshop meeting, and we had not planned to do that. However, there will be a meeting later this month of all the group chairmen and the organizers in Washington; the ground for an action plan will be laid at this meeting. This fall, another workshop meeting is planned at which we will develop a plan for actions, particularly for the development of those technologies which were recognized as mandatory or at least desirable during our first workshop meeting.

The purpose of the first workshop was to offer an opportunity of exchanging technical information related to the design of future space telescopes, and of identifying the research and technology efforts which are needed in support of future missions. This purpose, I feel, was well accomplished during the first workshop.

I will keep you posted on all future developments of this effort.

Ernst.

Ernst Stuhlinger

Enc:
Cy NOTES 4-28-69

B 5/1

NOTES 4/28/69 BALCH

4/28 JS

S-II-8 - Post-static checkout is continuing, with stage contractor operations on a 40-hour work week. All work is on schedule to meet the on-dock KSC date of 6/30/69.

S-II-9 - "Power-up" and telemetry automatic checkout were accomplished on 4/23/69, with no problems encountered.

S-IC-10 - Evaluation of data from static firing on 4/16/69 is continuing. Current plans call for removal of stage from test stand on 5/1/69 and shipment to Michoud on 5/2/69.

BOMEX - All BOMEX ships have now departed Gulfport. Ships are expected to be on station by 5/1/69 and to start acquiring data on 5/3/69. First shipboard acquired data is tentatively scheduled to arrive at MTF on 5/7/69.

Edgewood Arsenal Project - Live testing started on 4/15/69 and has continued successfully to date.

Emergency Planning - A site-wide civil defense shelter survey and analysis was performed on 4/23/69 by MSFC Emergency Planning representatives, with NASA, General Electric, Boeing, and North American Rockwell personnel participating.

NOTES 4/25/69 BECKER B 5/1

4/25/69

SPACE SHUTTLE TASK TEAM - The first oral technical reviews of the Integral Launch and Reentry Vehicle Studies (ILRV) will take place during the week of April 28 to May 2. The schedule is as follows: April 29, General Dynamics/Convair at MSFC; April 30, Lockheed at MSFC; May 1, North American Rockwell at MSC; May 2, McDonnell Douglas at LaRC. Most of the Task Team members will travel to MSC and LaRC to attend these reviews. ✓

SPACE STATION TASK TEAM - Inter-Agency Support for Manned Experiments: Reference Heimburg notes of 1/20/69 concerning discussions of a micro-biological experiment with personnel of the National Communicable Disease Center (NCDC). Dr. Bagby, Deputy Director, NCDC, advises that they cannot support development of an automated experiment for Workshop flights but desire to pursue such experiment opportunities afforded by manned laboratory operations in the Space Station/Space Base. ✓

Status of Major RFP's: The MSFC RFP on the experiment module was issued on April 22. It is expected that approximately 6 to 8 proposals will be received. The RFP on the Phase "B" Space Station Study is scheduled for release by Headquarters this coming Monday. Langley Research Center reported this morning (4/24) in a briefing that their RFP on "experiments definition" was issued on April 11. The proposals are due in by May 15, and only two contractors (McDonnell-Douglas and GE) are expected to bid. ✓

SATURN V WORKSHOP/B_0 - McDonnell Douglas gave a presentation at MSFC on April 24 concerning their wet vs dry workshop study for Dr. Mueller. Bill Schneider, John Disher, and Bill Greene, NASA/ML attended. Significant points from this meeting are as follows: (a) Bill Schneider asked if MDAC had in any way analyzed the desirability of flying the backup hardware in a dry mode. They had not, but was told that we had looked into this in considerable detail (B_0) and would like to discuss this with him, (b) MDAC did not present any cost or schedule information - only potential areas of cost and schedule deltas, (c) MDAC does not plan to present their study beyond Schneider, i.e., to Mueller or Mathews, unless invited to do so. It appears that Dr. Mueller will not have had this presentation prior to the retreat meeting (1 May) except as briefed by Schneider, (d) the results of this meeting indicate that NASA/ML (AAP) is definitely against reorienting the core program; but interested in developing a case for a dry workshop alternate mission for the core program backup hardware. ✓

LUNAR ROVING VEHICLE TASK TEAM - The orientation meetings for the LRV contract with Bendix and Grumman were held this week at MSFC. ✓

NOTES 4/28/69 BELEW

4/28 PM

B 5/1

EXPERIMENT T020 PRELIMINARY REQUIREMENTS REVIEW: The Preliminary Requirements Review for the T020 Experiment, Foot Controlled Maneuvering Unit, is to be held at Langley Research Center on May 1, 1969.

AIRLOCK MODULE CONTRACT NEGOTIATIONS: Negotiations with MDAC-ED on the Airlock and Systems Engineering and Integration contract were initiated Monday, April 21.

ENGINEERING SIMULATION REQUIREMENTS AND SCHEDULES: An MSC contingent will be at MSFC April 29, to discuss the engineering simulation requirements and schedules. MSC will be in the posture to identify any additional engineering simulations that they feel are requirements. Additionally, an agreement will be reached between the two Centers as to what engineering simulations are required to be successfully completed before a Crew Station Review is held for either a Preliminary Design Review or Crew Design Review.

H-ALPHA TELESCOPE REDESIGN: Perkin-Elmer will present their analysis with respect to the changes required on the H-Alpha Telescope as a result of the request that they incorporate the adjustable mechanical reticle system. The meeting will be held April 28-29.

ATM SCHEDULE ASSESSMENT: During the last two weeks, the ATM Engineering Manager (Gene Cagle) held a series of meetings within the S&E Directorate to resolve some apparent ATM schedule delays. A preliminary assessment indicates that for the flight unit, we are up to three months late on meeting the KSC delivery requirements per ML-15. One of the reasons we are not able to improve the flight unit schedule is the unavailability of sufficient MSFC checkout personnel to work the prototype unit thermal vacuum testing and flight unit checkout in parallel.

SOLAR ARRAY SYSTEM (SAS) AND WACS CONTROL ELECTRONICS PRELIMINARY DESIGN REVIEWS (PDR's): Previous plans were to conduct the subject reviews in May and June respectively. This week, it was revealed that for a variety of reasons, the design status will not support these dates. Astrionics has indicated that September and October can be supported.

ZERO "G" TEST: Zero "g" flight tests for the Saturn I Workshop were conducted at Wright Patterson Air Force Base on April 9-11, 1969. The purpose of the flight was an initial zero "g" evaluation of the quick opening hatch, initial entry light, vent line and pressurization line sealing devices, large equipment box transfer through the Airlock Module and Saturn I Workshop hatch openings, and the equipment transfer device.

LM-A ABORT GUIDANCE SYSTEM: Now that the LM-A Abort Guidance System in the AAP-4 mission is eliminated, a determination is being made to see if the AGS hardware itself should be completely removed (or remain inactive or partially active). Pending results of the study, Grumman has been relieved of the requirement for an active AGS in the AAP-4 mission.

NOTES 4-28-69 BROWN

B 5/1

4/28 9A

F-1 ENGINE - Reference notes of 4-7-69 concerning fatigue failure of fuel high pressure duct because of improper thickness material. Duct replacement will be necessary on flight engines 83 through 88. Two of these engines (83 and 84) are installed in a stage (S-1C-12). Recurrence of this problem is not anticipated since 1) bosses are no longer procured from the vendor who supplied the improper bosses, 2) all bosses procured from this vendor have been reinspected, and 3) the new bosses are being made in-house by Rocketdyne.

Reference notes of 3-3-69 concerning engine system testing for qualification of S-1C servoactuators. The planned testing for 10 tests and 1300 seconds have been completed on both Hydraulic Research and Moog actuators. No problems were encountered.

120" SOLID MOTOR FOR THE TITAN IIIM - The first seven segment, 120" solid motor for the Titan III M was tested on 4/26 at United Technology Center (UTC). (A total of eight or nine firings is planned.) Brief information about the test is:

Case Hardware - Five reused segments and two new segments

Burn Time - 120 seconds

Thrust - about 1.40×10^6 lbs. at sea level (about 1.60×10^6 at altitude)

Thrust Vector Control - Liquid secondary injection using N_2O_4 as the fluid.

Quick Look Results - All objectives were successfully met. Based on visual inspection, the hardware and nozzle looked good. One anomaly was encountered. An N_2O_4 manifold broke at about 103 seconds, resulting in a fire on the exterior of the nozzle. However, UTC reported that the test went to completion with no serious damage or ill effects.

NOTES 4/28/69 CONSTAN

4/28 PS

B 5/1

Visit of Economic Mission of Japan to Michoud

On Monday, April 21, 1969, the Economic Mission of Japan to the Southern United Stated visited the Michoud Assembly Facility. This Mission is sponsored by the Japanese Government and is composed of nine members (chairman or president of company) of Japan's Chemical, Textiles, Shipping, Heavy Industry, Electric, Petrochemical, China, and Metal Industries. Accompanying the group were Messrs. Okuda and Ikeda, Consul-General and Vice Consul-General, respectively, of Japan at New Orleans, and Mr. Alberto C. Fowler, Director of International Relations for the City of New Orleans. Following a welcoming address by the NASA/Michoud Manager, the group was given an orientation on NASA's space program and Michoud's role in the space program. The group was then conducted on a tour of the plant.

NOTES 4-28-69 Downey

B 5/1

4/28 RS

1. ASTRONOMY PLANNING: I attended a two-day meeting of the Astronomy Planning Panel of the PSG in Washington. Dr. Stuhlinger, the MSFC representative on this panel, attended the second day and presented the overall NASA high energy astronomy program.

Dr. Harold Glaser of OSSA discussed the solar physics planning. His proposed program was not aggressive, in my opinion. He discussed three classes of solar telescope payloads; namely, the 15-30 arc sec OSO's, the 1-5 arc sec ATM's, and the 0.1 arc sec class large solar telesccpes, which will come in the 1980's. Dr. Glaser mentioned various program options for ATM-B. These options included a new man-attended spacecraft such as the module design generated in the ATM Follow-on study, use of the back-up ATM-A systems hardware to carry new experiments, use of OAO for ATM-B, and resurrection of AOSO.

Dr. Les Meredith presented the optical astronomy program. An evolutionary OAO program (OAO's to do everything in space astronomy) is being pushed strongly by GSFC. OAO evolution into an unmanned 120" diffraction limited telescope was shown. Solar payloads and grazing incidence X-ray telescopes were also included on OAO's. After OAO-D, the OAO's will be launched by Titan III class vehicles.

Dr. Stuhlinger presented the high energy program. His presentation was the most forceful and meaningful of the two-day meeting. Mr. Mitchell said that Super Explorer was his highest priority new hardware start planned for FY-71. A three-option program proposal was presented for Super Explorer. These options represented only minor deviations to the proposed program I presented to you last Monday. Jesse Mitchell was very pleased with the proposal and our work to date in general. ✓

2. OSSA POSITION ON SPACE STATION ASTRONOMY: I do not believe that Mr. Mitchell will be willing to associate a major astronomy start with the Space Station until NASA makes a firm commitment to build the Space Station. Mr. Mitchell indicated that we should plan for facilities on the Space Station to accommodate, on a short lead time basis, a variety of small astronomy experiments. In particular, he mentioned the UV experiments platform being designed by Astrionics. ✓

NOTES 4/28/69 FOSTER

4/28/69 B 5/1

POP 69-1 FOR RESEARCH AND PROGRAM MANAGEMENT (R&PM) - Results of the MSF review of Marshall's R&PM POP 69-1 are as follows:

($ in 000)

	FY-69			FY-70		
	MSFC Request	Proposed MSF Plan	Δ	MSFC Request	Proposed MSF Plan	Δ
Total	116,361	116,361	.0 /1	112,201	111,501	-700 /2

/1 Although Marshall's FY-69 authorization was not reduced, MSF feels that our plan is susceptible to cost savings of $350K in the following areas: (1) Travel (100K), (2) Overtime (150K), and (3) Supplies and Materials (100K). ✓

/2 In the MSF FY-70 operating plan, Marshall's allocation has been reduced $700K below our request. This reduction considers the Teague Subcommittee reduction of $3.4M in the MSF part of the R&PM budget. MSF considers that the following areas are susceptible to savings totalling $1,393K: (1) Overtime (150K), (2) Communications (200K), and (3) Equipment (1,043K). ✓

Due to the current FY-70 Budget outlook, MSF has requested that our equipment purchases b held to a minimum, and that purchases replace lease arrangements only where a rapid payback is indicated. Further, to the extent that funds become available within FY-69, we have been instructed to apply the money to our support contracts as forward funding to provide maximum flexibility for FY-70. ✓

HOUSE SPACE COMMITTEE MARK-UP OF FY-70 BUDGET - The House Space Committee has completed its mark-up of NASA's FY-70 Authorization Bill. The bill has not yet been reported out by the committee, but we have been informed that the committee accepted the subcommittee mark-ups without change. Subcommittee recommendations add $229.2 to the Johnson budget request and total $274.2 more than Mr. Nixon's revised request. The committee is reported to have had only one dissenting vote on this mark. This may mean no more than that the committee wants to be on record as not contributing to the further decline of the national space program. ✓

INFORMATION KITS FOR REP. WAGGONNER - Rep. Waggonner (D-La.), member of the MSF Subcommittee, has asked Capt. Freitag for information kits on MSF Centers. We have, with the assistance of Public Affairs, provided MSF with two loose leaf brochures on MSFC history, organization and capabilities. One brochure will be given to Rep. Waggonner and Capt. Freitag will retain the other. ✓

RESCHEDULE OF SENATE AUTHORIZATION HEARINGS - Senate Space Committee Hearings scheduled for April 23/24 were cancelled. The hearings will begin Monday, April 28 with Dr. Paine's testimony. Dr. Mueller and Dr. Lundin are scheduled to testify April 29 and 30. Mr. Tockley of our office is observing these hearings. ✓

NOTES 4/28/69 GEISSLER

B 5/1

4/28/69

1. Space Shuttle Inhouse Aerodynamic Support: A series of scale model aerodynamic test programs is scheduled for our 14-inch Trisonic Facility in support of the Space Shuttle Vehicle studies. In about one month, a simplified model of the tip tank, ascent stage will be tested to obtain stability data in pitch, yaw, and intermediate roll positions for use in determining control system logic and cross coupling effects. Tip tanks will be pressure instrumented for structural and mass fraction studies. The data from this simplified shape will produce the asymmetric aerodynamics and tank loads required for the first cut to control and structures studies. Additional tests will be conducted during July on a scaled Monomese configuration (single Triamese body) furnished by GDC. Parametric stability data will be obtained over a Mach range from 0.2 to 5.50. In August, tests will be conducted in the 14-inch tunnel on the Lockheed Star Clipper Space Shuttle configuration. Stability, tank distributed and total loads data will be obtained on a parametric model furnished by Lockheed.

2. American Geophysical Union - 50th Annual Meeting: Eight scientific papers, written by members of our Aerospace Environment Division and associated contractor personnel, were presented at the 50th Annual Meeting of the American Geophysical Union, Washington, D. C., April 20-25, 1969. These papers discussed the results of studies concerning: (A) the development of an improved upper atmospheric model, (B) the analysis of satellite drag - determined density and thermosphere probe data, (C) solar activity predictions, and (D) ionospheric properties.

3. Appointment of Senior Postdoctoral Research Associate: Dr. C. A. Harvey, of Honeywell, Inc., has unofficially informed us that he will accept a one-year appointment as a senior postdoctoral research associate with our Laboratory. Dr. Harvey, an outstanding research scientist, has published many major results in optimal and adaptive control theory. His research here will be directed toward space station and shuttle vehicle attitude control problems. Dr. Harvey's associateship will begin in August.

4. AIAA Dynamics and Control Conference: A paper, "Attitude Control of a Manned Earth Orbiting Space Station," has been accepted by AIAA for presentation at the AIAA Dynamics and Control Conference in Princeton, New Jersey, August 18 - 20, 1969. Bob Ryan and Gene Worley, of our Dynamics and Flight Mechanics Division, are coauthoring the paper.

B 5/1

NOTES 4-28-69 GOERNER

4/28 NB

1. REACTOR-THERMOELECTRIC/SPACE STATION STUDY: The week of June 16-20, 1969 has been set for an Interim Progress Report on the Reactor-Thermoelectric/Space Station Study. The presentation will emphasize the proposed Atomic Energy Commission (AEC)/Atomics International (AI) and MSFC cooperative development schedule and the growth capabilities of the R_x-TE system. Additional detail of selected subjects covered during the December briefing will also be included. The MSFC inhouse study team managed by PD-DO-EP and the AEC contracted AI study team will make the presentation to interested space station and management personnel. AEC representation from division level or higher is expected. ✓

2. PRESENTATION TO OART RESEARCH ADVISORY COMMITTEE: Mr. Brantley of our office and Mr. Graff, S&E-ASTR-EP, will present AAP Cluster, Lunar Surface, and Reactor-TE Power Conditioning problems and proposed improvements to OART's Research Advisory Committee on 4-28-69 in Washington. MSFC participation was requested by Mr. Woodward, Space Power and Electric Propulsion Division of OART. ✓

B 5/1

NOTES 4-28-69 GRAU

4/28 9 AS

1. S-II PROGRAM: Five S-II stages (3 through 7) have been subjected to post cryogenic tank inspections at MTF without any significant defects being found. Based on this fact and discussions with Astronautics Laboratory, we have agreed to the deletion of this inspection beginning with S-II-8.

2. STATIC FIRINGS: We recently held a short review of the static firing failure study which FEC has been conducting. The study revealed that twenty-three failures were detected during static firings which could not have been found at any time other than static test or firing. These twenty-three failures would have resulted in launch delay or loss of mission had they occurred during a countdown or a flight.

NOTES HAEUSSERMANN 4/28/69

B 5/1

4/23 9 5 5

No submission this week

NOTES 4/28/69 HEIMBURG

B 5/1

4/28/69

1. AS-514 S-IVB STAGE BURNER OVERHEATING CONDITIONS ISOLATED: There is a slight chance that the AS-505 S-IVB O_2H_2 burner may overheat during flight operation if the burner operates in the "hot" corner of the operating box. After careful review, it was concluded that the AS-505 burner has not been tested at sustained low fuel tank pressures and may overheat at these conditions. The probability of this is considered low. The AS-505 burner will be subjected to only a normal flight mission duty cycle. Its capability to perform this duty cycle has been demonstrated during ground test. Therefore, it was our recommendation to fly the S-IVB-505 burner without additional testing.

2. S-IC-5 FUEL TANK ANOMALY: After completion of RP-1 fueling, a procedural error caused a negative pressure to occur in the fuel tank. This developed when pneumatic power to the stage was inadvertently removed permitting the prevalves to open. Damage was experienced when (1) the fuel tank bulkhead buckled and was subsequently blown out by repressurization, (2) the vent line was pulled loose from the interstage and (3) the brackets holding the fuel tank solenoid were pulled loose. Subsequent inspection revealed wrinkles on the dome. An extensive inspection of the bulkhead is underway by The Boeing Company with S&E-QUAL and S&E-ASTN personnel. No impact assessment has been made at this time.

3. ORBITAL WORKSHOP HABITABILITY SUPPORT SYSTEM (HSS): A meeting was held at McDonnell-Douglas Astronautics Corp., Western Division (MDAC-WD) on April 23 between representatives of MDAC-WD, MSC, and MSFC for the purpose of establishing a test program to support the final design solution for the urine processor. A vacuum drying procedure has been proposed as an alternate to the recommended freezing procedure to process and store urine samples. The proposed test will compare the results of freezing and drying procedures, including the effects of prolonged storage on urine constituents. If it can be proven that drying does not appreciable effect the urine constituents any more than freezing, then our urine processor design will probably go in favor of the drying procedure. This will simplify our design for the urine processor as well as provide storage savings in the Command Module (CM).

4. POGO: Recent POGO analyses of S-II-505 using the updated outboard line data (18 Hz) does not improve the stability time history. Therefore, the combined structural propulsion model remains inadequate to produce valid POGO stability results. Effort continues in the incorporation of bulkhead test data into the stability model.

5. MAN-SYSTEM LOCOMOTION CONTROLLER CRITERIA FOR EXTRATERRESTRIAL VEHICLES, PHASE III: During a system final checkout driving over the simulated lunar terrain test course, the Bendix MTA vehicle suffered a wheel failure while being driven through one of the craters. The left front wheel support arm fractured at a welded joint. Inspection of the weld failure revealed a defective weld. Test Division personnel gave high priority to repairing the vehicle so it would be operable for the Columbia Broadcasting System (CBS) TV interview and lunar roving vehicle driving demonstration on April 23 at the simulated lunar terrain test site. Public Affairs Office requested through the Director, Astronautics Laboratory, support for the CBS LRV demonstration. Mr. Vaccaro was requested to be the test subject in the Litton hard spacesuit for the CBS LRV driving demonstration and interview.

NOTES 4-28-69 Heller
4/28 OK

B 5/1

1. PHYSICS & ASTROPHYSICS DIVISION: As you know, Dr. Alfred Weber is Chairman of the Physics Department of St. Louis University and has been with SSL every summer for ten years. Three weeks ago I asked him, with the approval of S&E, to become the Chief of the Physics and Astrophysics Division, and he accepted. His requested sabbatical from the University has been granted. He spent three days with his Division last week to become familiar with the status of our scientific activities and to start giving scientific direction in some specific cases. He will take over full time in five weeks. All members of SSL, especially those of the P-Division, are very glad about this. ✓ So am I B

2. OPTICAL CONTAMINATION PROGRAM: I had a telephone conversation with Bruce Lundin of OART about our SSL optical contamination program and the recent presentation to him on this subject which was organized by Hugh Dudley and Dr. J. Dozier. Mr. Lundin told me that he is well impressed with our program, that it is well thought out and that it compares favorably with all other programs, including that of the Air Force. We ourselves knew this since we are in contact with all other groups in the country, but it was good to hear it from Bruce Lundin. He indicated that OART is going to sponsor this in FY-70. We discussed some very urgent needs for in-house instrumentation. He requested an immediate FY-69 submission for our most urgent needs. This has been done through Dr. Johnson's office. ✓

3. SCIENTIFIC ENGINEERING DIVISION: With the approval of S&E, Dr. Sieber will be starting today to function as Chief of SSL-S, the restructured and renamed Scientific Engineering Division. All internal transfers within SSL will also become effective today. As you already know from Karl Heimburg, Fritz Pauli, who has been with SSL on loan from Test Laboratory since last fall and was expected to fulfill a key role in SSL-S, won't be with us any more. We are going to miss him. ✓

Dr. von Braun:

Dr. Weber is an outstanding addition to SSL. You might suggest to Gerhard that, if your calendar permits, you would like to spend five or ten minutes talking to Dr. Weber.

JTS
4-28-69

Bernie. OK · Bv 5/5

Please arrange Bs/1

NOTES 4/28/69 HOELZER

4/28 JVA

B 5/1

1. ACCEPTANCE TESTING OF THIRD GENERATION COMPUTER SYSTEM:

Acceptance testing began on Saturday, April 19, 1969. Two good days of running were experienced on Saturday and Sunday. Monday, Tuesday, and Wednesday exhibited an excessive amount of downtime causing at least 22 hours of downtime to be logged on Tuesday. The problem was located on Thursday at approximately 6:50 p.m., and is attributed to a serious error in the system software. The error was corrected by UNIVAC and overall system operation has improved.

2. COMPUTER SUPPORT FOR REDSTONE SCIENTIFIC INFORMATION CENTER:

Progress on the on-line system for the Redstone Scientific Information Center (RSIC) continues in spite of difficulties with third generation equipment. Several systems servicing RSIC can be placed in a production status in a very short time once the computer hardware and software are stabilized. In the meantime, we are continuing to furnish to RSIC necessary support on our second generation equipment.

3. COMPUTER SUPPORT ON THE UNIVERSITY OF ALABAMA-HUNTSVILLE UNIVAC 1108:

Since early April when the Computation Laboratory UNIVAC 1108 Executive VIII system was configured in order to begin acceptance tests, we have had to rely on the University 1108 Executive II system for much of our business-type computer applications.

Processing substantial machine runs off-post has led to a number of delays, operational problems, and late reports. This situation is expected to continue for some time, or until Executive VIII become more stable and can handle our entire workload on-site. We expect improved service, however, and are working to eliminate these problems as well as to attempt to get the more urgent reports out first. Backup arrangements for Executive II processing at Slidell are also being investigated.

B 5/1

NOTES - HUBER - 4/24/69

4/28 9 TS

1. NUCLEAR (XE) ENGINE TEST FIRINGS: The nuclear XE engine intermediate power test ran successfully on 4-16-69 achieving 450 MW and 3100° R chamber temperature. The full power test scheduled for 4-30-69 has been postponed to the following week, due to problems with the test stand exhaust cooling system.

2. LUNAR PLANNING PANEL: The PSG Lunar Planning Panel (Capt. Scherer) has defined 5 program alternatives for SA-516 and beyond. These ranged from buying 6 more Saturn V/Apollos to introducing a 3-man direct capability with a Saturn V lunar logistics system (requiring major Saturn V uprating). Capt. Scherer is concerned about a potential program gap between 515 and any follow on, since it will be 1974 at least before any new systems could be introduced, because of probable budget constraints and currently estimated lead times.

NOTES 4/28/69 JAMES

4/29 9:45

B 5/1

1. AS-505, Oil Canning of S-IC Fuel Bulkhead: During a planned mod to the KSC facility at 1:00 am Sunday morning (April 27), it was noted that a balance valve in the GN_2 distribution panel was leaking. Work was started to remove and replace the valve. In order to replace the valve, GN_2 pressure was dropped. This GN_2 pressure is supplied to the S-IC fuel prevalves to keep them in a closed position. Dropping of the pressure caused the prevalves to open, allowing fuel to drop to the main valves and pass through the overboard drain lines located between the prevalves and the main valves. Approximately 5,300 gallons of fuel was lost creating a negative pressure in the fuel tank. This caused the fuel bulkhead to buckle inward. A 5 psi pressure was applied to the fuel tanks causing the bulkhead buckles to reverse, but this left several creases or wrinkles in 3 gore segments of the bulkhead. The fuel vent line was damaged and has been replaced; the fuel vent valve is operational but will also be replaced. A visual inspection has been completed and a dye penetrant test and an ultrasonic test are being performed today. If these tests show that the structural integrity of the bulkhead is satisfactory, CDDT will start tomorrow morning. I will keep you briefed on the developments.

2. AS-505 Performance Status: General Phillips, by letter to me this week, expressed his concern on maintaining confidence in our preflight performance predictions. This concern stemmed from the S-IC stage low performance on the Apollo 9 mission, and he asked that we assure that the data available to the public (plot boards and press kits) will agree with the best performance estimates on any change to performance estimates for AS-505 and subsequent. In closing, he encouraged us to use this instance to generally tighten the weight and performance reporting of changes in the form of a detailed description of the nature of each change. A detailed assessment of the AS-505 performance status is currently in progress and is scheduled to be available for transmission to General Phillips on May 1, 1969. We and S&E are reviewing the performance prediction cycle to identify actions required to assure that our performance predictions are maintained in an up-to-date status and are disseminated as changes occur.

3. Review of Contractor Manufacturing and Test Planning Interfaces: A NASA review team, chaired by George White, Apollo R&QA, has recently completed a review of the Apollo/Saturn prime contractors' manufacturing and test planning interfaces. The briefings given by our Saturn contractors were excellent and only minor problems were identified. The team was impressed by the steps which have been taken by MSFC to assure that all test/inspection requirements transferred to another site are identified clearly and tracked.

NOTES 4/28/69 JOHNSON

4/28 9PM

B 5/1

Nothing of significance to report.

NOTES 4/28/69 MOHLERE

4/28/69

B 5/1

Nothing of significance to report.

B 5/1

NOTES 4/28/69 MOORE

4/28 PM

1. AAP-4 Cluster Stability: An analysis has been completed of the AAP-4 Cluster Stability under ATM CMG control for the situation where one of the CMG's has failed. This was an area of concern raised by Langley Research Center as being unstable. Our detailed analysis determines that a CMG failure appears as a loop gain reduction which can be adequately handled by sizing the CMG vehicle loop gains properly prior to launch and will not involve an in-flight gain change. The analysis will be verified during ATM simulation testing with hardware later this year.

2. CMG Actuator Pivots: The CMG torquer gear chipping problem is still with us. During a second test of an actuator pivot chipping of gear teeth again occurred. Chipping during an earlier test was accredited to gear out-of-roundness. These loaded gears are dry lubricated and are of hardened material in order to overcome reduced CMG bandwidth due to backlash in the original gear design. Gear chipping occurred after three days in test. We are investigating if even tighter alignment tolerances can cure the problem; if not, we may have to settle for a reduced CMG bandwidth. Reduced bandwidth is adequate for AAP applications; however, when we announced this situation earlier, Dr. Mueller advised us to pursue a fix which did not limit future CMG applications. You will be kept advised.

3. CMG Thermal Vacuum Testing: Thermal vacuum testing of a total CMG with associated electronics was completed last week with satisfactory results. Indications are that the CMG Inverter Assembly, which mounts separately from the CMG, would reach a temperature during the AAP-4 preoperational period (first 12 hours after liftoff) too low for application of power at ATM solar array deployment. Passive thermal conditioning is being pursued in order to circumvent the use of active heaters involving need of battery power.

4. Miniature TV Camera: The MSFC Technology Utilization Office, in response to a request originating from Dr. Paine, has requested that we demonstrate the MSFC miniature television camera at the annual meeting of the President's Committee for the Employment of the Handicapped in Washington on May 1 and 2. You recall that the camera utilizes a miniature vidicon for light sensing and is small enough to slip into your coat pocket. Mr. Carl Huggins, the Technical Supervisor of our contract with Teledyne for this work, will conduct the demonstrations.

B 5/1

NOTES 4/28/69 MURPHY

4/28/69

System Safety Surveys at Michoud and MTF: This past week, we completed a System Safety Survey of Michoud and MTF and included both Boeing and North American Rockwell operations at MTF. Our findings indicated that both Michoud and MTF have focused attention to a safe operation through proper management attention to the subject. At MTF both North American Rockwell and Boeing have the system safety people review and sign-off on all test and operation procedures. We established complete confidence through in-depth discussion and review with the real operating people that they, in fact, use their procedures religiously and have very well qualified people.

We are convinced that the MTF operation by both contractors is excellent today in the checkout, processing, and static firing of our stages. We did, however, express real apprehension with both contractors concerning the possibility that over-confidence and/or complacency that could very well set in. Both organizations will be phasing down in personnel and activity in the near future. As a result there is always the tendency to short-cut procedures or reduce emphasis on a safe operation. It behooves all of our managers to consistently call attention to this possibility and to provide additional incentives to the operating elements to insure that such complacency and/or over-confidence does not set in.

Navy Certification of the Ben Franklin: We have been working with the Navy to insure proper certification of the Ben Franklin prior to its mission. The sub-mariner section of the Navy is currently performing a certification, including the review of safe operating procedures. Progress is slow because much of the documentation is written in the French language.

If an impact develops toward the scheduled launching of the Ben Franklin because of related problems, we will advise you.

B 5/1

NOTES - 4/28/69 - NEWBY

4/28/69

PRESIDENT'S COMMITTEE FOR EMPLOYMENT OF THE HANDICAPPED:

Plans are complete for participation by the Technology Utilization Office in the annual conference of the President's Committee for Employment of the Handicapped. Mr. Dave Winslow will present a paper on the Patient Monitoring Unit and Mr. John Graham will speak about the sight switch wheel chair. The wheel chair will be demonstrated by Hayes-Huntsville. Mr. Carl Huggins of Astrionics Laboratory will demonstrate the mini-TV camera.

ATM CLEAN ROOM:

We have received Headquarters' approval of Project 8028 (ME Laboratory ATM clean room), and AAP funds have been provided for this work and the design of ACE area modifications. We have not yet received approval of Project 8029 (Quality Laboratory clean room and ACE area modifications). ✓

NOTES 4-28-69 SIEBEL

B 5/1

4/28/69

1. S-II Pogo: North American Rockwell has designed a new LOX duct and accumulator for the S-II center engine. This duct employs a jointed outer tube that is an effort toward reducing the buildup of stage vibration. We will fabricate one duct for static test. The modification of the S-II Structural Stand and mini-stage for vibration tests continues with work on schedule. The existing mini-stage has to be raised for insertion of the thrust structure. The lifting hardware will be load-tested to 75 tons by piping 20,000 gallons of water into the LOX tank. Following this test, the somewhat tricky job of breaking the epoxy joint between skirt and support ring will be undertaken. Planned procedure for doing this has been discussed with the Astronautics Laboratory and their okay requested. ✓

2. MDA: The S&E-ME fabricated MDA has been installed in the test fixture at Building 4619, and the base for assembly of the airlock is being installed and leveled to receive epoxy application. The McDonnell airlock is scheduled to arrive about May 1, 1969. ✓

Lee Below What's the problem? B

3. ATM: ATM funding still remains a problem. S&E-PR (Planning & Resources Office) has released $100,000 for fabrication services and direct materials. This amount is not sufficient to cover the outstanding actions for fabrication nor for all outstanding direct material procurement requests. Schedule critical items are being held up. We are now in our third week of this delay.

4. ATM: Polyalkene insulated wire made by Raychem is used in ATM distributors. The problem of stripping the insulation from this wire has been investigated. The cryogenic wire stripper developed by ME some time ago was used on AWG 16, 20, and 22 wire. The insulation is not as slick as teflon; therefore, the short piece to be removed from the end of the wire is more difficult to pull off after being fractured. Under a magnification of 7X, no conductor damage could be seen. Three cryogenic wire strippers are available for immediate use. ✓

5. Payload Shrouds Flight Hardware: Verbal authorization has been received from PM-AA (Apollo Applications Program Office) to initiate procurement action for all rings required from McDonnell/Douglas for all flight payload shrouds. ✓

6. Lunar Drill: Work on the lunar drill is continuing and an urgent request for modification of the Morris Radial Arm Drill has been received from the Astronautics Laboratory. This hardware will be used in lunar drill bit development. ✓

NOTES 4/28/69 SPEER

B 5/1

4/28/69

Apollo 10 Range Safety: Evaluation of the Apollo 10 (Pad B) range safety problem is continuing. Loss of engine 3 directly after liftoff in conjunction with a steep trajectory would lead to unacceptable destruct lines unless the launch azimuth is limited. KSC feels that a limit of 84° azimuth (approximately 2 hour launch window) would completely eliminate the problem and provide satisfactory protection to the VAB. However, MSF has established 90° azimuth (nearly 3 hour window) as minimum acceptable. Present analysis (based on trajectories provided by AERO) is to result in two sets of destruct lines (for both worst and mean winds from 75°). Since launch release is wind limited for vehicle structure and S/C land landing, it is hoped that consideration of these limits for the range safety problem will permit launch azimuths somewhat above 90°, or a window in excess of three hours.

NOTES 4-28-69 Stuhlinger

4/28 OK B 5/1

1. PSG ASTRONOMY PLANNING GROUP: Jim Downey and I attended a PSG Astronomy Planning Group meeting on April 23 and 24. I had to give a presentation on the High Energy Astronomy program. This program includes the Heavy Explorer project which PD has been studying during past weeks. The presentation led to a lively discussion of several hours. Although opinions differed somewhat regarding some programming aspects, the program proposal in general found unanimous acceptance and strong support from all members of the group. Mr. Mitchell stated again that the Heavy Explorer program will have first priority on OSSA's FY 1971 budget submission. ✓

2. WORKSHOP ON OPTICAL TELESCOPE TECHNOLOGY: Arrangements have been essentially completed for the Optical Telescope Technology Workshop to be held at MSFC on Tuesday, Wednesday and Thursday of this week. The purpose of the workshop is to permit an exchange of technical information related to the design of future space telescopes and to identify the research and technology efforts which are needed in support of future missions. The sponsoring offices are OART and OSSA; they have compiled an invitation list which consists primarily of people at the working level who are directly involved in optical telescope technology problems on a daily basis. After two general sessions in Morris Auditorium, the attendees will break up into prearranged work groups, roll up their sleeves, and really attack the technology problems confronting them. Mr. Barry Graves of Langley Research Center is the Technical Program Chairman, and I am the Chairman for General Arrangements at MSFC, which is serving as host Center. ✓

E.S.

This OTES Workshop was very well planned and organized. Congrats to all who helped making it such a success.

Please send me a copy of the Action Plan in the Technology Area that was finally agreed upon when everybody went home.

B 5/11.